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The Impact of Building Code Regulation on the Manufactured Housing and Mobile Home Industries

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THE IMPACT OF BUILDING CODE REGULATION ON THE MANUFACTURED HOUSING AND MOBILE HOME INDUSTRIES

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TABLE OF CONTENTS

PART II. BUILDING CODES FOR FACTORY MANUFACTURED HOMES

PART III. BUILDING CODES FOR MOBILE HOMES

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Efforts to understand the relationship of the built environment to the context in which it is placed are constantly expanding into new areas. This is, of course, due to the fact that architecture is concerned with the "total system" and thus deals directly with a wide range of disciplines.

This study centers in on one aspect of the larger problem. It is concerned first with the organization of the construction industry and the effect this organization has had on the development of industrialized housing. Secondly, the study focuses on a specific aspect of the construction industry that has significantly affected the growth of industrialized housing - building codes.

Building codes have historically been a major tool by which innovative technology has been suppressed. Recently, however, there has been a growing trend towards the establishment of state-wide mobile home and factory manufactured housing building codes. This study deals with the impact of these two codes on their respective industries and on the New York State community.

PART I

BACKGROUND OF THE HOUSING INDUSTRY

THE STRUCTURE OF THE CONVENTIONAL HOUSING INDUSTRY

The structure of the building industry is an extremely complex system, with a variety of internal as well as external determining factors. The processes that are carried out within this system all interact within the overall framework of the socio-economic-political organization (see Fig. 1).

The Socio-economic-political Organization

The particular structure of the housing industry is shaped by values and goals determined through the political process. Each choice of social and/or economic goals has an effect on the output of the building industry and, therefore, on the supply and type of housing.

The Internal Network

The conventional homebuilding industry is in control of events only within a limited area of the total system. Decision making within this system is highly compartmentalized. This results in a flow of information in only one direction. Additionally, methods of communication tend to be highly stylized and simplified.[1] For example, working

[1] John Roberts, "Home Building USA: A Systems Analysis," Industrialized Forum, April, 1970, pp. 35-40.

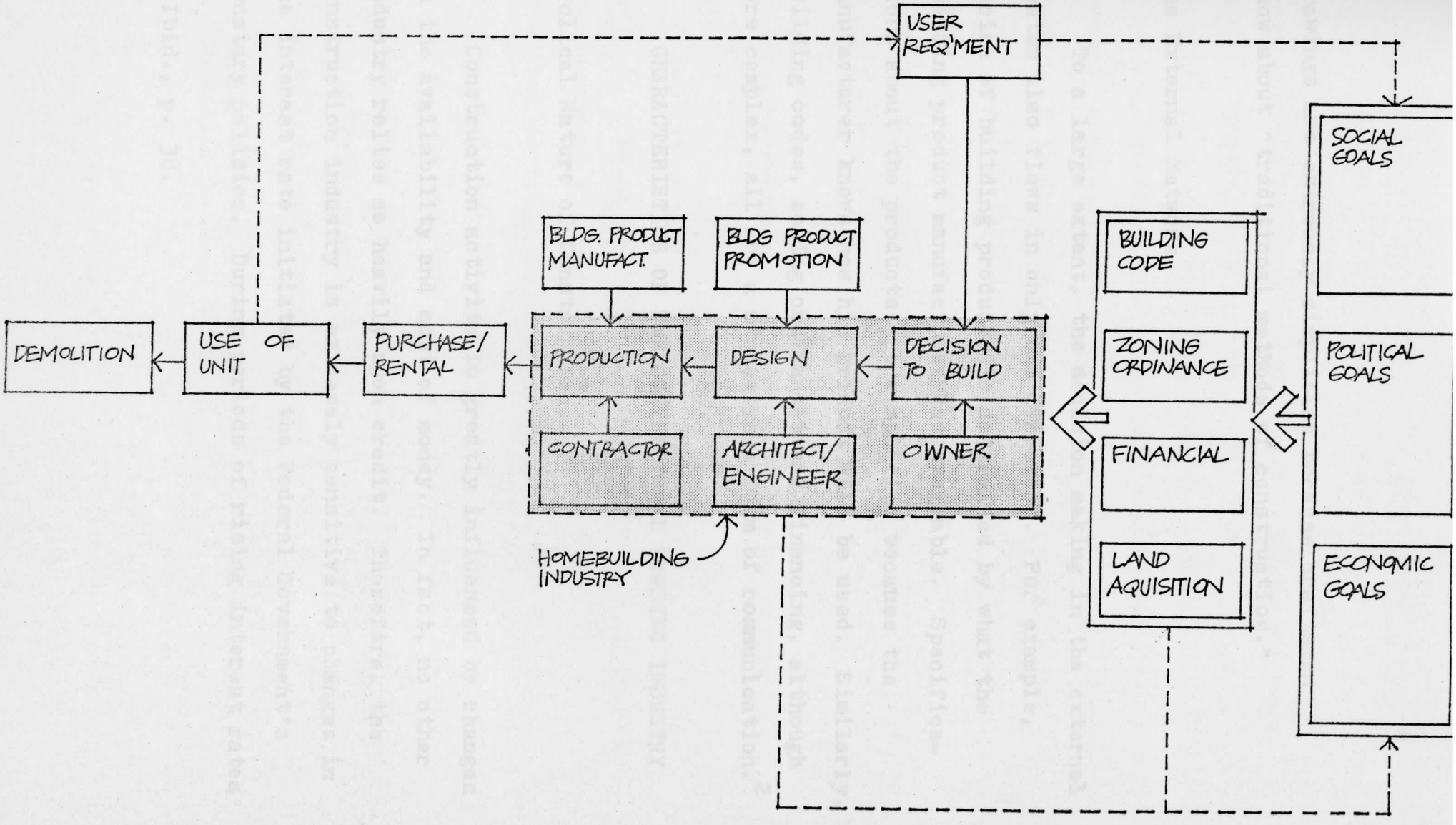


FIG. 1. - THE HOMEBUILDING INDUSTRY

drawings are extremely simplified because craftsmen know about "traditional methods of construction."

The External Network

To a large extent, the decision making in the external system also flows in only one direction. For example, choice of building products is determined by what the building product manufacturer has available. Specifications about the products are simplified because the manufacturer knows how his product will be used. Similarly, building codes, zoning ordinances and financing, although more complex, all are a stereotyped form of communication.[2]

CHARACTERISTICS OF THE CONVENTIONAL HOUSING INDUSTRY

Cyclical Nature of Construction

Construction activity is greatly influenced by changes in the availability and cost of money. In fact, no other industry relies so heavily upon credit. Therefore, the construction industry is extremely sensitive to changes in the interest rate initiated by the Federal Government's monetary policies. During periods of rising interest rates

[2] Ibid., p. 38.

the number of construction starts noticeably decreases. However, this decrease may also be related to another factor. Housing is a durable good. During periods of economic recession, consumers, having available less disposable income, tend to postpone the purchase of durable goods (e.g. a new car, a new house). A larger portion of their income goes towards the purchase of essential, less durable items (e.g. food, clothing). Thus, the combination of rising interest rates and consumer buying behavior generates a type of "boom or bust" cycle for the housing industry.

Resource Allocation: Capital, Labor and Materials

The set of tasks intrinsic to any economic system are: 1. fixing the composition of output, 2. allocation of resources, 3. distrubution of the product and 4. growth.[3] As stated earlier, the composition of output (e.g. how many and what kind of houses will be produced) is determined by individual consumer preferences as well as by political decisions. How the houses will be produced in our society depends on the relative prices of the inputs and many legal and social restraints.

[3] George J. Stigler, The Theory of Price, (New York: The Macmillan Company, 1966), p. 12.

Capital. The cyclical nature of construction plays an important role inddetermining the relative price of capital. The inability to fully utilize sophisticated labor-saving machinery during a period of low level business activity drives up the cost of this machinery. (A similar phenomenon occurs in the automobile industry. However, labor intensive methods of constructing automobiles are unrealistically expensive. The auto industry is able to absorb the costs of capital under-utilization.) Thus, the low level of capital utilization in the conventional construction industry appears to be a logical outgrowth of the nature of the industry itself. Capital costs in the construction of single family houses, measured by depreciation allowance on equipment during the period 1959-1962, was about 1.0% of the total cost of the dwelling.[4] When large construction machinery is required, it is often rented rather than purchased.

Labor. Due to the low level of capital investment in heavy equipment, the construction industry is considered a labor-intensive industry. However, the relative price of labor has been increasing at an accelerating rate. During the period from 1957-59 to 1968, labor costs increased 57%, while the cost of construction materials increased only 10.2%. One would expect, then, that

[4]Peter J. Cassimatis, Economics of the Construction Industry(n.p.: The Conference Board, n.d.), p. 51.

contractors would attempt to find substitutes for labor. It has already been determined that investment in expensive, sophisticated machinery is not reasonable. However, new methods of building (e.g. 4 x 8 sheets of plywood subsitituted for 1 x 10 sheathing) and the introduction of more productive, small scale equipment (e.g. substitution of electric saws for hand saws) has resulted in some improvements in operation effieiency. At the same time, the traditionally craft-oriented labor unions have resisted these changes, slowing down the process of change. The net result is that any savings due to new materials and methods has been more than offset by rising labor costs.

Materials. Of the three inputs, building materials make up the largest portion of total building costs. If the source of materials, the use of materials or the handling of materials is ineffieient, then the costs of construction will be significantly affected. The souree of building materials varies widely. However, most of the materials originate from relatively nearby sources. Distant material suppliers are used only when value/unit is high and transportation cost low.[5]

The financ ial burden of carrying goods grows heavier as products become more finished. It is important to

[5] Reavis Cox and Charles S. Goodman, "Marketing of Housebuilding Materials, in Social Issues in Marketing, ed. by Preston, Lee E.(Glenview, Ill: Scott Foresman and Co., 1968), p. 65.

reduce to a minimum the amount of storage for finished and nearly finished goods. There are two ways to achieve this goal.[6] First, the principle of massed reserves: stocks of goods held by a few agencies rather than many individuals reduces the dost of storage. This occurs because fluctuations into and out of individual firms to some degree offset each other, requiring a smaller total stock of goods. The construction industry appears to utilize this principle since building contractors do not store materials to a great extent. Second, the principle of postponement: inventory costs are reduced by deferring as long as possible the commitment of a material to a specific use. Again, this principle is widely utilized in the construction industry, where most materials are cut to size on site.

The choice of materials by the contractor also appears to be responsive to small cost differences. At any one time, many alternative suppliers of building products are available, with few monopolies or brand preferances. While the competitiveness of this situation seems desirable, it also results in a lack of routinization of affairs. Were the industry to be vertically integrated, organizational economies might be realized.

[6]Ibid., p.66.

Economies of Scale

A survey of construction firms reveals that the industry is composed of a large number of small firms. The largest home builder in the country has only 1-2% of the total housing market.[7] This extreme decentralization indicates that there are few economies of scale in traditional construction. It is also consistent with the general notion that the optimum scale of production varies directly with the degree of sophistication of technology. Other aspects of the construction industry indicate the presence of diseconomies of scale. The variability of existing building codes and zoning ordinances restricts somewhat the geographical market area of large scale builders. Also, working relationships between contractor, subcontractor, architect and manufacturer are discontinuous and of short duration. This prevents the establishment of efficient managerial techniques.

Institutional Factors

Compartmentalization. In the design of manufactured products the aesthetic and functional requirements are considered simultaneously with the method and costs of

[7] U.S. Department of Housing and Urban Development, Design and Development of Housing Systems for Operation Breakthrough (Washington, D.C.: US Government Printing Office, 1973), p. 3.

production. In construction, the design of the product, the construction of the product and the equipment required for the use of the product are almost completely separated. The design of buildings is usually the job of an architect. In most cases the architect does not have advance knowledge of who the general contractor or subcontractors of a particular project are likely to be. Similarly, he cannot forsee the construction techniques, equipment or labor that the contractor will employ. This forces the designer to 1. ignore these factors, 2. design the project so that it can be built by one of several available contractors or 3. utilize the "prevailing construction practices."[8] The ultimate result of this is the reluctance on the part of the architect to introduce innovative techniques or new construction materials.

Building Codes. The difficulty in obtaining product approvals for innovative construction systems has been a major factor in preventing the increased productivity of the construction industry. This subject will be analyzed in a later section of this study.

Labor Unions. The major roadblock to change exhibited by labor unions is their resistance to the introduction of new materials and techniques. This is primarily due to the belief that labor-saving construction

[8] Cassimatis, Economics of the Construction Industry, p. 118.

techniques will reduce employment of union members.

Research. It is generally accepted that increases in productivity are largely due to technological innovation. Also, the degree of industry-sponsored research and innovation that occurs appears to be proportional to the size of the firm. Historically, the small scale, fragmented character of the construction industry has inhibited research efforts. In the past the government provided little in the way of construction research.[9] While government sponsored research has increased recently, it is still small in comparison to that of other countries.

Housing Costs

There is a great variation in housing costs from one part of the country to another, and even from one builder to another. This makes it difficult to generalize housing costs. However, one source suggests that materials and labor together represent only 55% of the total initial costs. The complete breakdown is as follows (for a conventional single family unit):

Developed Land	25%
Materials	36%
On-site Labor	19%
Overhead & Profit	14%
Financing	6%
	100%

[9] John Galbraith, The Affluent Society (Boston: Houghton-Mifflin Co, 1958), p. 258-259.

For apartment units with elevators, the cost of developed land as a percent of total costs decreased to 13%, while all other categories increased.[10]

Financial Institutions

The flow of mortgage money is critical to the creation of housing regardless of need or demand for that housing. Further complicating matters, housing has to compete in a free market with the rate of return available in other areas of the economy.

Mortgage investing institutions include deposit thrift institutions (Mutual Savings Banks, Savings and Loan Associations, Commercial Banking Institutions) and contract thrift institutions (Life Insurance Companies and Retirement Funds).[11]

The mortgage lending institutions in both of these categories are very sensitive to rising interest rates. Deposit thrift institutions find that, during periods of high interest rates, the rate of return on savings accounts does not compare favorably with other investment opportunities. This causes a reduced inflow of money and thus lending must be curtailed.

[10]Roberts, A System Analysis, p. 36.

[11]U.S. National Commission on Urban Problems, Building The American City (Washington, D.C.: US Government Printing Office, 1969), p. 452-3.

Contract thrift institutions, while less subject to erratic cash flows, react to the ceilings imposed on mortgages by State laws and Federal regulations by selecting investments outside the housing industry with a higher yield.

Conclusion

Due to particularly the cyclical nature of the market, the building industry has retained its small scale character and fragmented functions. To put it another way, in order to survive, the construction industry has developed an adaptability unique among major industries.[12] A study of the marketing methods in the industry reveals that there is little waste or redundancy, that marketing methods are responsive to small cost differences, and that the system has adjusted itself to minimize the financial investment burden.[13]

[12] US Department of Housing and Urban Development, Industrialized Building - A Comparative Analysis of European Experience(Washington, D.C.: US Government Printing Office, 1968), p. 61.

[13] Cox and Goodman, Marketing of Housebuilding Materials, p. 67-68.

INDUSTRIALIZED HOUSING IN EASTERN EUROPE

Housing Needs

The Eastern European countries in the post World War II period faced a critical housing shortage and an extremely disorganized construction industry. In the face of this threatening crisis, these countries had to respond in a manner that would quickly alleviate the problem.

Characteristics of a Planned Economy

A centrally planned economy implies that a group of controllers issue orders dealing with all economic matters, including 1. the quantity of each product to be produced and 2. the relative amounts of capital, natural resources and labor each firm will be allotted to produce its product. While there is no completely planned economy in the world, the Eastern European countries are partially planned economies. In such a political and economic context, industries considered critical are closely supervised, while others provide an opportunity for individual choice.

Production Decisions - What to Produce

Faced with housing needs as outlined above, the construction of homes became a critical industry in the Eastern European countries. In the U.S.S.R., the planning of housing output was largely based on this need, as defined by the government. However, the exact share of available resources allocated to the housing industry was politically determined, and depended upon the relative importance of heavy industry, the military and high priority scientific research.[14] All the significant decisions concerning the production of housing were made at high government levels.

Production Decisions - Methods of Production

The State Construction Committee (Gosstroy) determined what materials and machines would be necessary to carry out the planned levels of production in the Soviet Union.[15] World War II had destroyed 40% of Russia's housing, and demand for new housing construction was overwhelming. The quality of housing was of secondary importance to the desire for rapid production. It was, therefore, the

[14] U.S. Department of Commerce, Industrialized Building in the Soviet Union (Washington, D.C.: US Government Printing Office), p. 9.

[15] Ibid.

need that forced the "leap to industrialization."[16] It is significant to note that, while housing has achieved a high degree of industrialization, construction procedures for other building categories in the Soviet Union are similar to those of the United States.

Conclusion

In the Soviet experience, the criteria for a successful industrialized housing system was based almost exclusively on 1. the production of a stated quantity of housing and 2. the speed in which this was done. The use of sophisticated industrialized housing technologies seemed to be the only feasible way of meeting these requirements. Industrialization was facilitated by the lack of any institutional restrictions. However, the "forced" substitution of capital for labor apparently has distorted the real costs of production. Uneconomic allocation of resources in the industrialized housing industry was strongly suggested by the US delegation to the USSR in 1965.[17] It may be argued that, despite initial inefficiencies, the long range effect has generated substantial external economies and economies of scale. This may be true to a certain extent. However,

[16] Ibid., p. 16.

[17] HUD, Industrialized Building - A Comparative Analysis, p. 83.

a real measure of the economic allocation of resources in the USSR is extremely difficult due to the particular political and social context.

INDUSTRIALIZED HOUSING IN THE UNITED STATES

Greenbelt Housing

The Greenbelt program was begun by the government to develop housing for people with incomes less than $2,200 per year. The initial phase was near Washington, D.C., where 1,000 homes were planned. Immediate reactions to the project were those dealing with the attitude of people towards low cost public housing. One real estate agent felt that the project was "un-American and tended to Communism."[18] In the short run, the program achieved limited success. It disproved the idea that low income people do not want to take care of their property. But over a period of years the program failed.

Economically, the project generated no return on invested capital. The reasons appear to be linked to the fact that 1. it never achieved its necessary size and 2. it never drew in the institutions (e.g. office buildings, factories) necessary to establish a town. Politically, Congress was forced to sell housing developed under the Greenbelt program due to post-war pressure to "get Uncle Sam out of the affairs of what

[18] Carl Koch and Roger Lewis, Roadblocks to Innovation in the Housing Industry (Washington, D.C.: US Government Printing Office, 1968), p. 12.

Congress considered the realm of business."[19] In 1952 land was selling for $950/acre. By 1965 land was selling for $16,000/acre. Obviously the increase in land values excluded the lower income families for whom the project had been intended.

Acorn House

After World War II many people thought that the idea of prefabrication had come of age. The logic was difficult to refute. It promised an increase of both quality and quantity while saving time, money and labor. The Acorn house was a demountable, two bedroom house with an 8' x 24' central wet core. The bedroom and living room wings folded up against the core for shipping. In one day four men could erect the house, which cost $9,500 in place.[20]

This attempt failed for several reasons: 1. some of the innovative techniques violated existing building code regulations, 2. financial lenders were hesitant to finance an unknown product that could be folded up and moved away and 3. the price was not significantly lower than comparable conventional homes.

[19] Ibid., p. 13.

[20] Ibid., p. 15.

Lustron

The Lustron home is probably the most well known failure in the history of industrialized housing in the United States. Lustron Homes was organized by Carl Strandlund, an engineer, just prior to World War II. In 1946 Strandlund was able to obtain a massive loan from the Reconstruction Finance Corporation (RFC) to finance an all steel, mass-produced home. Several years later the plant in Columbus, Ohio, was in operation with the capacity to produce one home every 14 minutes.[21]

Again, the failure of the Lustron Home is primarily due to the socio-economic-political structure of society. First, Lustron appeared on the market during the first quarter of 1949, a period of recession and just after the peak post war housing demand had been met. Second, when variables such as land and utilities were added, what began as a $7,000 house ended up $10,000 or more. Dealers were reluctant to construct at these prices without a commitment from a buyer. Thirdly, as with the Acorn house, traditional lending institutions were not anxious to finance the construction of a prefab house. Therefore, dealers who could sell houses were in an impossible cash flow position, with $6 - 10,000 tied up for the many months

[21] Richard Bender, A Crack in the Rear View Mirror (New York: Van Nostrand Reinhold, 1973), p. 58.

it took to close a mortgage. Finally, the government's financial support for Lustron collapsed with the foreclosure by the RFC in March, 1950.

Mobile Homes

The experience of the mobile home industry differs greatly from other industrialized housing systems. Originally small, undersized trailers with few conveniences, mobile homes have evolved as a significant source of primary housing. This has occurred despite a great deal of bad publicity concerning the mobile home image of poor construction, safety hazards and identification with transients. The success of the mobile home has been the result of primarily two factors: 1. the ability of the mobile home to respond to the needs of particular segments of the housing market and 2. the ability of the industry to side step the conventional building constraints of financing, codes and land; thereby enabling the use of less expensive construction methods.

CONCLUSION

The growth of industrialized housing in the Soviet Union shows that there is no inherent technological barrier to the introduction of a highly sophisticated industrialized housing industry. The barriers appear to be institutional in character, arising from the social, political and economic context of the housing market.

It has historically been this context that has largely shaped the form of the conventional homebuilding industry. Because of this context, effieiency of production methods have not been as important in the industry as have adaptability of production methods. Adaptability, in turn, lead to fragmentation of the industry and relative technological stagnation.

But the social, political and economic factors that have resulted in the present structure of the industry are not inactive. The fact that mobile homes currently account for over 20% of the housing in the United States indicates the need of at least a segment of the population for less expensive forms of shelter. Another potential for altering the housing industry (as well as other sectors of the economy) is the massive, worldwide shortage of material resources predicted by economist Robert Heilbroner in his recent book, An Inquiry Into the Human Prospect.

Institutional factors that have traditionally created insurmountable barriers to innovation are also slowly changing. Labor unions have successfully negotiated contracts with producers of factory manufactured homes. States are continually enacting legislation providing for preemptive state-wide mobile home and factory manufactured housing building codes. This trend, while expanding the effective market area for the industrialized housing producer, has also created problems which restrict the growth of the industry. It is these problems that will be analyzed in the following section.

INTRODUCTION TO THE IMPACT OF BUILDING CODES ON THE COMMUNITY AND ON THE MOBILE HOME AND FACTORY MANUFACTURED HOUSING INDUSTRIES

INTRODUCTION

Building Codes are adopted by States to protect the public health, safety and general welfare as they relate to the construction and occupancy of buildings.[22] This is true for manufactured buildings as well as for conventional buildings. However, the housing industry is extremely complex. Laws and regulations promulgated to protect the public health and safety may not always produce the best possible solution in terms of supplying adequate quantities of low cost housing.

The profusion of state and local regulations, designed to protect the public health and safety, sometimes makes it significantly more difficult for the private industrialized housing industry to effectively operate. Also, individual states do not generally look at the housing problem in terms of its interstate consequences. Few state codes dealing with mobile homes and manufactured housing have insured nationwide or even regional code uniformity. For example, the legislation of different energy conservation building requirements on a state-by-state basis may make it more difficult for manufacturers of homes to market their products interstate.

Therefore, the objective of this study is to

[22] Richard L. Sanderson, Codes and Code Administration (Chicago, Ill: Building Officials Conference of America, 1969), p. 13.

estimate the impact of code regulation on both the economic and social performances of the mobile home and manufactured housing industries. As a basis for understanding the industrialized housing building codes, an overview is given of building codes in general. Then, a brief description is provided of the ways in which governments of various levels have been involved in building regulation. Next, the performance of manufactured housing building codes is analyzed, followed by an analysis of the mobile home building code. Finally, recommendations are presented to help improve the building code regulations of both the mobile home and manufactured housing industries in the State of New York.

While many sources of information have been consulted, special acknowledgement should be given to Professor Arthur D. Bernhardt, Director, Program in Industrialization of the Housing Sector, Massachusettes Institute of Technology, for his help in the preparation of this study. The analysis of mobile home building codes and much of the background material on mobile homes has been prepared by Professor Bernhardt. Professor Bernhardt also provided access to the following studies which were invaluable in the preparation of this study. First, the CES Study refers to the National Bureau of Standard's extensive field survey on State Building Code regulation, conducted in 1972 and known as

the Coordinated Evaluation System Project. Much of the national information concerning both mobile home and manufactured housing building codes was obtained from this source. Secondly, the Industry Survey refers to a 1972 Survey of Manufacturers; Interviews of Selected Manufacturers, and General Problems and Conclusions Concerning State Industrialized Housing Laws prepared for the National Bureau of Standards by Reidelbach-Simpson Associates, Annandale, Virginia.

BACKGROUND INFORMATION

Legal Source of and Limits to the Power to Regulate

The power to enact, administer and enforce building codes is a part of the "police power" of soverign political units, In the federal system of the United States, individual states retain many sovereign characteristics, including the freedom to exercise, individually, the police power. The police power is an essential means by which states accomplish what is often seen as the central purpose of government - the promotion and protection of the public's health, safety and welfare.

The tenth amendment of the United States Constitution reserves to the states and their citizens "the powers not delegated to the United States by the Constitution, nor prohibited by it to the states." This grant is the Consititutional basis for any state exercise of the police power. State legislatures frequently delegate police powers to subordinate community governments (counties, towns, villages and cities). The incorporation of any local political unit within a state generally involves a grant of some part of the state's police powers. Powers not thus granted may be delegated by special "enabling acts." In turn, local governments can (and in some cases must) further

delegate the powers to write, administer, and enforce rules and regulations, just as state governments establish state administrative bodies to implement legislative acts. A local official or board, for example, is usually empowered to handle conventional building code regulations.

The discretion which may be granted to administrative authorities must be appropriately limited. Federal Constitutional requirements of due process and equal protection, among others, must be met, as must state constitutional requirements. Finally, the scope of local regulation may be strictly limited by the wording of enabling legislation or by other state or federal law in the same field.

Despite such limits, legal challenges to the validity of any given aspect of building code regulation are not likely to be fruitful. Judges and juries cannot be expert in every field, and legal recognition of this fact is given in the "presumption of validity" granted to the activities of administrative authorities and agencies. Such authorities and agencies are assumed (sometimes incorrectly, perhaps) to possess a level of expertise in their fields which courts cannot match. Except in cases of unauthorized or unconstitutional regulation, courts will not strike down regulations or overturn administrative decisions unless they are clearly unrelated to public welfare or are clearly ineffective in promoting the public welfare. A rule or

decision will usually stand even if it is "arguably" aimed at, and effective in achieving, a public good.

Specification Codes and Performance Codes

Building codes may be classified into two categories: 1. performance codes and 2. specification codes. A specification code is generally easy to draft and administer. It simply describes current building methods and materials and requires that these methods and materials be used on every new structure. The obvious disadvantage of such a code is that it freezes technology; innovation is rejected regardless of its merits. A pure performance code is difficult and expensive to formulate. It can be especially difficult to administer and enforce. Ideally, a performance code isolates every critical factor in the construction of a unit and prescribes criteria for evaluation of every material and construction method. Such a code, if well written, gives the widest latitude to innovators. A building, however, is very complex. Factors which may not seem critical in a given type of construction, such as conventional wood frame construction, may become highly critical in another type. As a result, there is considerable disagreement as to the tests which must be made to evaluate a proposed structure. In addition, minimum performance

criteria must be set for each of the factors chosen, and the selection of these criteria is often another source of dispute among code writers. Finally, good administration of performance codes requires well-trained administrators and inspectors; sophisticated testing equipment must also be available.

Invariably, the problems of code drafting and administration are solved by compromise. Existing codes usually utilize specification criteria, with some provisions more closely approximating performance type criteria.

Units of Control and Influence

Federal Government. The federal government has been very hesitant to impose standards, through federal codes, on states and municipalities. Federal legislators are very much aware of the principle of home rule in regulating the construction industry. Instead the federal government has focused its energies in four areas: requirements for federally constructed buildings; requirements for programs using federal funding; research into building technology and support of standards programs.

When constructing new federal buildings, the General Services Administration uses national codes to set minimum standards for the building, while also complying with local

codes.

Requirements are often placed on municipalities if they wish to receive federal funding for their building programs. Adoption of codes based on a national model has been a prerequisite before funding was given for urban renewal project.

The federal government conducts research into building technology largely through the National Bureau of Standards. In addition, many private agencies and quasi-public agencies are funded to do such research.

The Department of Commerce and other federal agencies are involved in coordinating and developing standards and testing procedures for use in framing and improving national codes. The National Bureau of Standards, working in close cooperation with the National Conference of States on Building Codes and Standards (NCSBCS), has been effective in encouraging the exchange of information between state officials and national code associations, providing for a greater technological uniformity among the states.

State Government. Building codes have been viewed historically as a local concern, reflecting local needs and desires. States have been slow to eliminate local "home rule" by preempting local codes with s statewide code. A strong force in maintaining this home rule is the power

structure at the local level. Presently, non-local interests seem to be gaining strength, and state-wide codes are becoming more common.

Only recently have states become involved in writing comprehensive codes similar to local building codes. These generally take one of three forms. First, the state may adopt a mandatory, preemptive state code. Any building meeting the minimum requirements of such a state code will be automatically accepted as meeting the local code. Most state manufactured housing and mobile home codes are of this mandatory, preemptive variety. Second, the state may adopt a model code which is not mandatory, relying on local jurisdictions to adopt the model code. The New York State Building Construction Code is of this variety. Third, the state may adopt a mandatory code that applies only to buildings constructed with governmental funds.

In addition, some states have passed codes, either mandatory or voluntary, which apply to special types of buildings. As of June, 1972, twenty-five states had legislation for factory-built housing, and thirty-five had codes applying to mobile homes.

Local Government. Since colonial times, local governments have been the architects of building codes. The codes usually deal with all types of buildings, though

special requirements or standards are applied to special use buildings. Generally, no specific codes for mobile home or factory-built housing will be found at the local level.

Local codes are often out-of-date. Other problems at the local level include dissimilarity among codes of adjacent communities, differing interpretations of code provisions, political pressure causing administratively unsound decisions, and the exclusion of mobile homes and factory-built housing by local interest groups through zoning and other devices.

Code Associations. Several national code associations exist for the purpose of advancing building codes that incorporate current technology while protecting the public's need for safety. The Building Officials Conference of America (BOCA) is most prominent in the East and North Central sections of the country. The International Conference of Building Officials (ICBO) has its greatest influence in the West. The South is best represented in the Southern Building Code Congress (SBCC). Each organization has representatives from its member states who are usually part of the state government. Each of the three has established a model building code which may be adopted as a mandatory or voluntary code by its member states. The

content of the three codes is similar but with suffieient differences that new technological material and methods may be acceptable to one and not to another.

To remedy this, ICBS, BOCA, and SBCC established a joint Council of American Building Officials (CABO) which will help iron out unnecessary differences under the CABO agreement. For example, any new material or method acceptable to one of the three code associations will also be accepted by the other two. In addition to ICBO, BOCA and SBCC, several other organizations have drawn parts of codes or entire codes. The National Fire Protection Association and the American Insurance Association are two of the more notable.

An instrumental group in the development of the ANSI mobile home code was the Mobile Home Manufacturers Association (MHMA). The MHMA is the major spokesman for the mobile home industry. It represents a sizable proportion of all mobile home producers, though a number of large producers are not members. Prior to state adoption of A119.1, the MHMA was relied upon by many states to police its own members to insure quality production. Since the widespread adoption of the ANSI standards, the MHMA has played a decreasing role in enforcing the code. However, it still conducts regular inspections of its members which serve as a cross check on state and third party inspections.

PART II.

BUILDING CODES FOR FACTORY MANUFACTURED HOMES

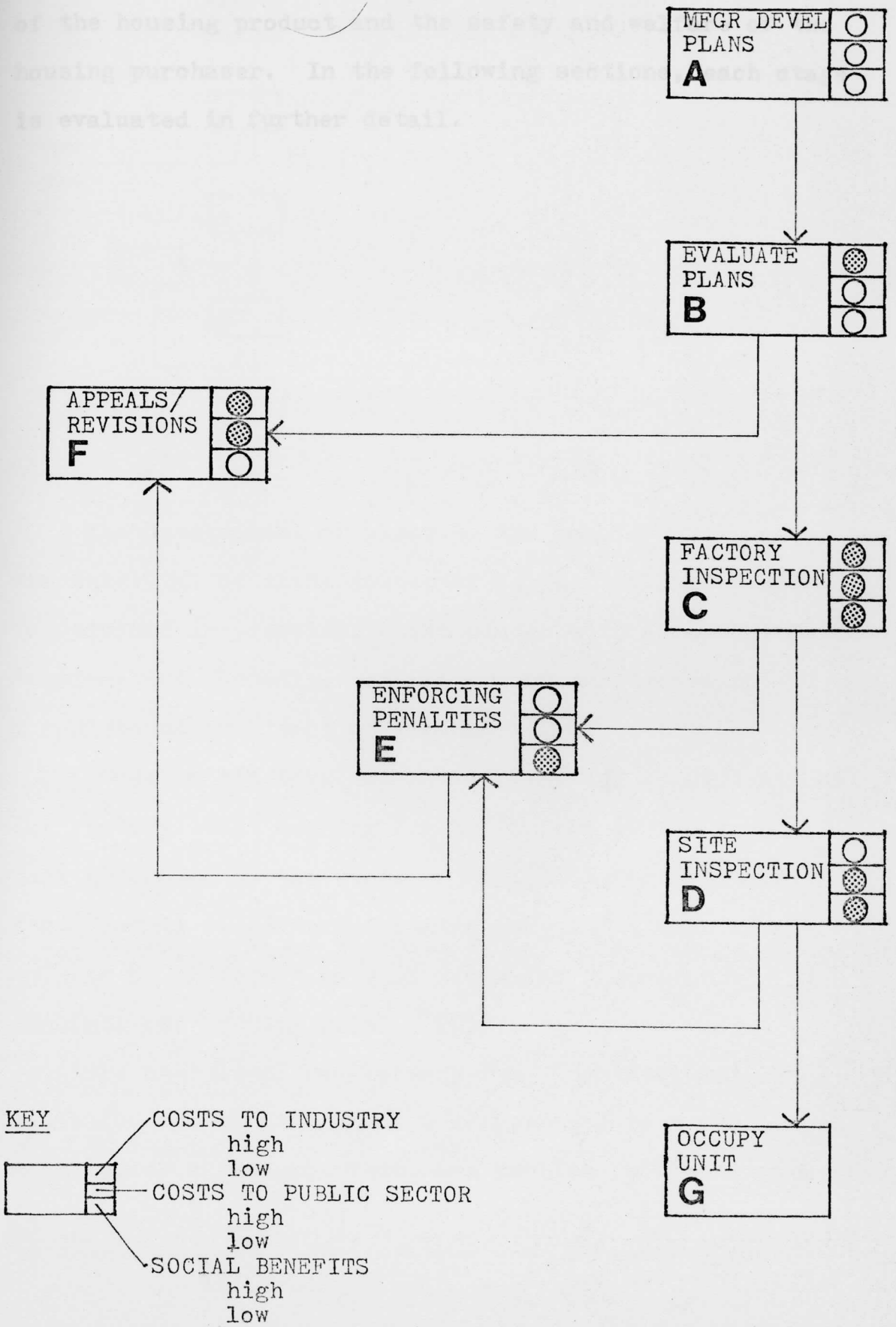
INTRODUCTION

Approximately twenty-four states currently have factory-built housing laws. Most of the laws passed are preemptive, requiring local agencies to accept the state laws regardless of local codes. These laws have generally had a significant positive impact on the industry. Most replies to the Industry Survey indicated that the factory-built laws have, on balance, been beneficial to the business interests of the manufacturer. However, some difficulties in specific areas have occurred which tend to somewhat offset the positive aspects of the law. The following section will consider the processes involved in the administration and enforcement of the factory-built housing laws to try and determine where these areas occur.

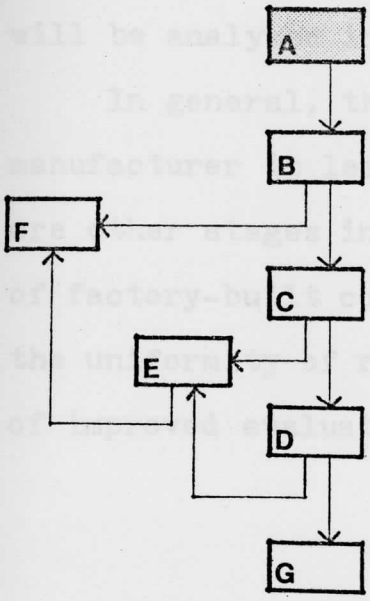
The flow chart on page 38 identifies the key stages involved in the administration of the rules and regulations for manufactured housing. Each stage is evaluated according to its impact on costs and benefits. Costs to the industry are those aspects in the regulation of housing that affect the productivity of the industry and thus its competitiveness with respect to conventional housing. Costs to the public sector are those expenses that accrue to the manufacturer and are ultimately passed through to the consumer. Social benefits deal with those aspects of the

FIGURE 2

FLOW DIAGRAM OF FACTORY-BUILT CODE PROCEDURES



of the administration of codes that affect the quality of the housing product and the safety and welfare of the housing purchaser. In the following sections, each stage is evaluated in further detail.



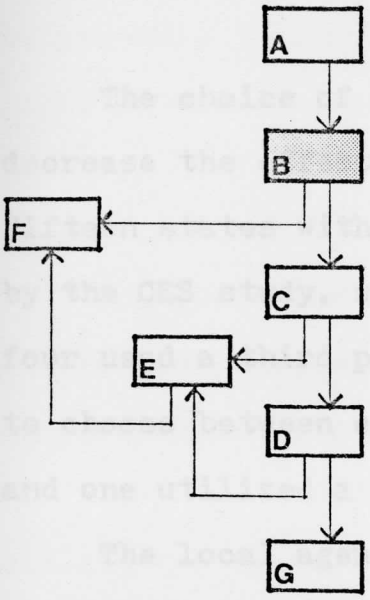
MANUFACTURER DEVELOPS PLANS

The development of plans by the manufacturer, and the submittal of these documents to the evaluating agency, is required in practically all states with a factory-built housing law. Usually, the plans must be stamped by a registered architect or engineer.

Costs in the development of plans and specifications for factory-built housing are influenced by the type of data requested by the state. Conflicting or arbitrary requirements of different states compel the manufacturer to draw up different sets of plans for the same manufactured housing model. This process not only requires additional unnecessary drafting time, but also calls for the additional cost of approval by a registered architect or engineer. Thus, one problem is how to establish

uniform requirements for all states. This consideration will be analyzed in the next section.

In general, the process of developing plans by the manufacturer is less critical to costs and benefits than are other stages in the administration and enforcement of factory-built codes. The major potential for improving the uniformity of requirements lies in the establishment of improved evaluation criteria.



EVALUATION AND CERTIFICATION

After the manufacturer has completed plans for a manufactured housing model, he submits these plans, along with other required documents, to an evaluating agency for approval. The objective of the evaluation procedure is to check the manufacturer's design for compliance with the building code. Evaluation procedures which require an unreasonable length of time to complete, or are unduly costly, or are non-uniform over the marketable area of the manufactured housing firm may unnecessarily increase the cost of the manufactured home.

Evaluating Agency

The choice of an evaluating agency can increase or decrease the effectiveness of evaluation. Of those fifteen states with factory-built housing codes surveyed by the CES study, seven used state agencies for evaluation, four used a third party, two states allowed the manufacturer to choose between either a state or third party agency, and one utilized a local agency and one the FHA-HUD area office.

The local agency and the federal agency represent two extremes of the possible agency choices. Evaluation by local building code officials would continue the prevalent practice of building code administration and enforcement at the local level. However, this delegation of power to write, administer and enforce building codes has also made code interpretation and enforcement extremely subject to local political influences and less responsive to technological change. At the same time it has tended to fragment a manufactured housing firm's market into an almost unmanageable complex of varying building standards.

The advantage of a federal agency is the degree of national uniformity that would result. However, there may be constitutional problems about any direct intervention of the federal government in local police powers.[23]

[23] "Factory-Built Housing: Statutory Solutions," The University of Chicago Law Review, (Summer, 1971), p. 792.

Due to interstate sales of factory-built homes, it may be possible to regulate the industry by the Federal Trade Commission, or a similar governmental authority. However, it is umprobable that states will readily accept the idea of relinquishing any home rule authority.

The choice of an evaluating agency appears to lie in the middle ground - either with a state agency or with an independent evaluation agency ("third party"). The CES study indicated that most states surveyed in fact utilize one of or a combination of these two evaluating agencies.

The Industry Survey of industrialized producers of homes indicated that, of twenty-five manufacturers, ten favored state level evaluation while fifteen favored third party evaluation. The reasons for their answers were mixed (see Table 1), perhaps reflecting the variability of factory housing codes among states and the differences between types of manufactured housing firms. However, their responses indicated that there are a number of areas that have an effect on industry and social costs.

Interstate Reciprocity

The choice of agency would probably have a dramatic

TABLE 1

INDUSTRY RESPONSES TO QUESTION OF PREFERENCE BETWEEN STATE OR THIRD PARTY EVALUATION AGENCY

Respondents' Comments	Respondents Favoring State	Respondents Favoring Third Party
Better communication with state agency	3	
State unwilling to forgo evaluation responsibility	1	
Lower cost of evaluation with state	3	
Less political influence with state	1	
Miscellaneous comments	2	
Less political influence with third party		2
Easier and quicker implementation with third party		2
Third party more qualified		3
More uniformity with third party		5

Source: Reidelbach-Simpson Industry Survey, Fall, 1972.

impact on industry costs by affecting the degree of interstate reciprocity. Most states do have conditional reciprocity programs. Of the eighteen states responding to the CES study on this subject, only five had not made provision for interstate reciprocity. However, these mutual recognition programs have not been widely implemented. While manufacturers report shipping factory-built

homes into 41 different states, none of the states surveyed at the time of the CES study had approved any out-of-state manufactured homes or components. (More recently, Washington and California have achieved a reciprocal agreement effective February 4, 1974. Indiana and Washington have also entered into a reciprocal agreement effective January 18, 1974[24]) The general insufficiency of reciprocity programs has meant that manufacturers shipping into other states have had to unnecessarily repeat the entire evaluation process for each state - a costly and time-consuming procedure. This cost is ultimately passed on to the home purchaser.

A major cause of this problem is the difficulty states have in evaluating other states' programs in terms of the equivalency of building codes and the evaluating and inspection agencies. Uniform interstate qualifications for plan approval and inspection personnel would help alleviate this problem. Further comments on qualifications will be made in a later section.

Utilization of third party evaluating and inspecting agencies, recognized regionally or nationally, would also reduce the problem of evaluating numerous state agencies. The example of North Carolina might be a useful model to adopt. North Carolina's only criterion for the acceptance

[24] "Washington-Indiana Reciprocity and Agreements with Out-Of-State Jurisdictions ..." National Conference of States on Building Codes and Standards News, Vol. 2, No. 4 (March, 1974), p. 1.

of units is that they be labeled by a state recognized independent testing laboratory having follow-up inspection. This system eliminates the need for multiple evaluations and still insures compliance with the code.

Probably the single most influential factor hindering the widespread use of third party evaluation agencies is the hesitancy of states to relinquish responsibility and authority. Those states that do use third party agencies (usually to reduce costs of approval to the state) generally retain final power of approval. If this final approval is just a rubber stamp approval of the work of the evaluating agency, then it unnecessarily adds administrative costs to the evaluation and increases the length of time for obtaining approvals. The other danger is that final approval by the state might ultimately lead to an extra layer of evaluation which would also increase costs unnecessarily.

Intrastate Considerations. Three respondents to the industry survey favoring state level evaluation reasoned that a state agency has a better understanding of the problems of the industry. Therefore, it was expected that the state would do a better job in administering the program. This attitude is also reflected by Myron J. Weeks, President of the National Association of Building

Manufacturers. Mr. Weeks feels that a state agency would have a greater degree of built-in flexibility and would ultimately be more responsive to the needs of the manufactured housing industry.[25]

However, the danger exists that close communication channels between the state agency and the manufactured housing organization, while responsive to the interests of the industry, may be less responsive to the needs of the public sector. Ventre has shown that the close ties between local agencies and the building industry have adversely affected the technological currency of building codes.[26] By applying pressure to local building officials, the various special interest groups of the building industry have effectively limited the introduction of innovative materials and components which might erode their established position. This phenomenon, referred to as the "protective purpose" of a firm,[27] is the most elementary goal of all business organizations, including factory-built housing concerns. A regionally or nationally recognized independent third party inspection agency would be less open to such local influence.

[25] James W. Hudson, "Beating Codes and Costs," Systems Building News, (January, 1974), p. 30.

[26] Francis T. Ventre, Maintaining Technological Currency in the Local Building Code: Patterns of Communication and Influence (Washington, D.C.: International City Management Association, April, 1971) Vol 3., No. 4, p. p.4.

[27] John K. Galbraith, Economics and the Public Purpose (Boston: Houghton-Mifflin Co., 1973) p. 94.

Evaluation Procedures

To assure the public sector a reasonable degree of compliance with the factory-built housing code, evaluation requirements must be determined. These requirements consist of specifying what is to be evaluated and how it is to be evaluated.

Model codes. The requirements which make up most factory-built housing codes are usually based on model codes. Of the twenty-four states that have adopted factory housing codes, ninteen cited the use of a model code. The geographical location of model code adoption in factory-built housing codes generally follows the same pattern of adoption as in conventional building codes. (see Fig. 3) The Basic Building Code is used mostly in the East and the Uniform Building Code is used in the West. Additionally, HUD/FHA standards are referred to by three Eastern states.

As was stated earlier, one problem restricting the implementation of interstate reciprocity is the difficulty states have in determining the equivalency of other states' building codes. The reason for this lies largely in the dissimilarity of code content between states. The use of model codes does not necessarily achieve the desired degree

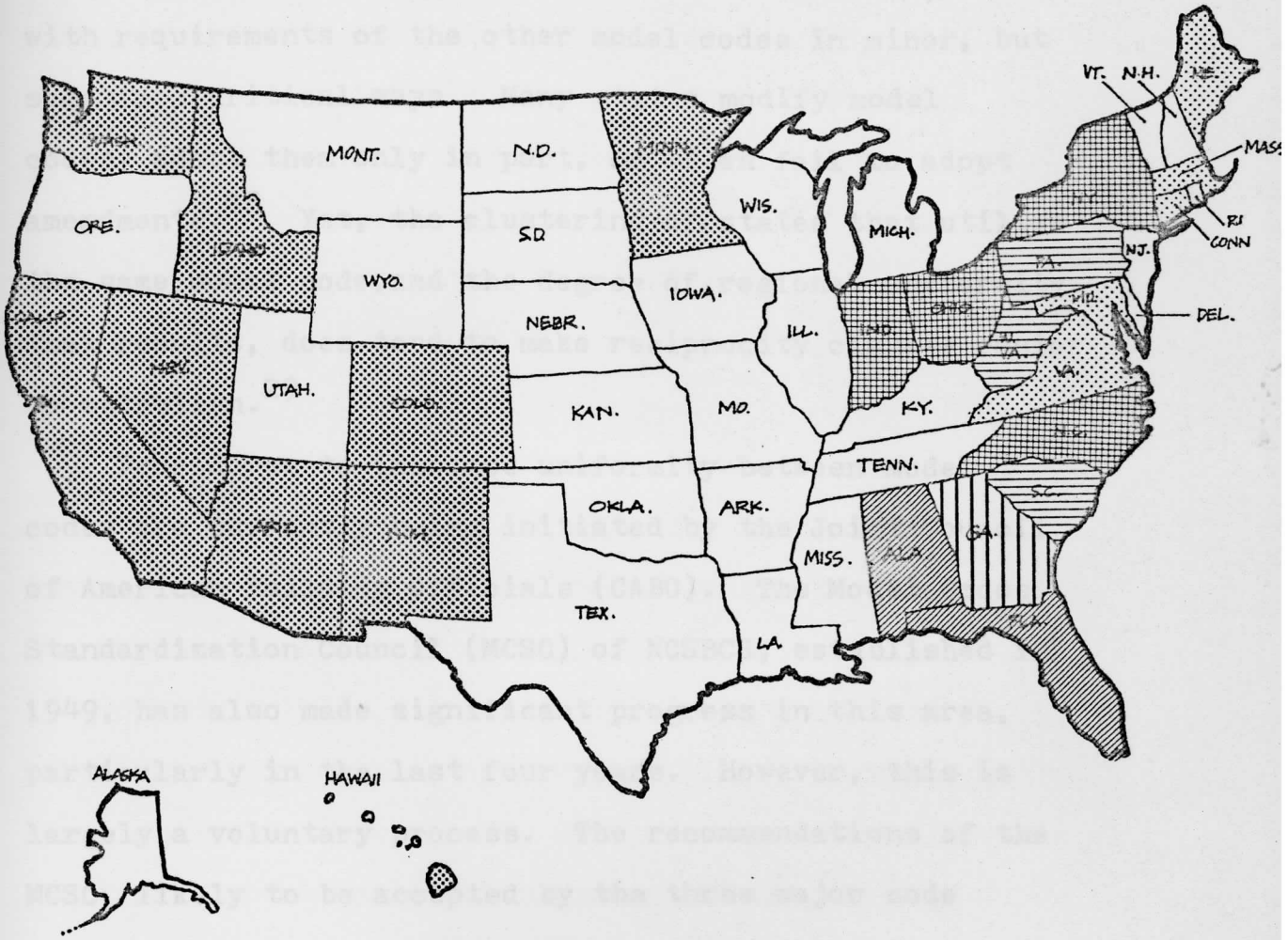


FIGURE 3

MODEL BUILDING CODES CITED BY MANUFACTURED BUILDING PROGRAMS

- Uniform Code (ICBO)
- Basic Code (BOCA)
- Southern Code (SBCC)
- HUD/FHA Standards
- Model Code (not specified)
- State Code
- States not surveyed or with no factory-built code

of uniformity. Each model code is usually inconsistent with requirements of the other model codes in minor, but sometimes critical ways. Many states modify model codes, adopt them only in part, or often fail to adopt amendments.[28] Yet, the clustering of states that utilize the same model code,and the degree of regional uniformity that results, does tend to make reciprocity clauses easier to establish.[29]

Procedures to increase uniformity between model codes are currently being initiated by the Joint Council of American Building Officials (CABO). The Model Codes Standardization Council (MCSC) of NCSBCS, established in 1949, has also made significant progress in this area, particularly in the last four years. However, this is largely a voluntary process. The recommendations of the MCSC, likely to be accepted by the three major code associations (BOCA,ICBO and SBCC), will probably not be recognized by the American Insurance Association.[30]

To achieve national uniformity it may be essential to establish a national standards issuing agency. There has been some action in Comgress to create such an agency,

[28] "An Analysis of the Probable Impact of the California Factory-Built Housing Law," Stanford Law Review, Vol 23 (May 1971) p. 978.

[29] Harold B. Finger, "Operation Breakthrough's Approach to Building Codes, Zoning and Site Design," The George Washington Law Review, Vol. 39, No. 4 (May 1971) p. 776.

[30] James C. Spence. Letter to Robert E. Johnson (March 11, 1974). (Typewritten)

referred to as the National Institute of Building Sciences (NIBS). However, the Act establishing NIBS was introduced in 1971 and its passage is uncertain.

In the immediate future, better adoption and amendment procedures might have the greatest potential for increasing uniformity. These will be commented on later.

Performance Requirements. The disagreement among code officials as to what criteria are necessary to insure desirable minimum performance characteristics (on which evaluation is based) impedes uniformity, as well as currency. It is difficult to establish desired performance characteristics, especially for new materials. Most codes therefore rely to some extent on specification standards, which have evolved unsystematically from past experience. This type of standard restricts the introduction of cost-saving innovative materials and techniques.

In the CES study, nine out of fifteen states indicated a need for better evaluation techniques of manufactured building systems. Specific areas of needed improvement included more qualified personnel, more funding to support a better evaluation program, and better access to information regarding test and evaluation standards. Two of the states

responding negatively to this question commented that all systems they had so far certified had been of conventional construction. The remaining four states used a third party evaluating agency to certify units.

The relative absence of performance standards restricts the introduction of innovative technology by failing to supply guidelines for developing acceptable products. Without such guidelines there is no assurance that research investments will beeprofitable. Although the process of developing performance standards is expensive and difficult, it is essential to technological innovation in the building industry.

Local or state evaluation agencies do not usually have the resources or personnel to develop adequate performance standards. The logical strategy would be to move in the direction of a regional or national standards body. There are a number of organizations that could achieve this goal, including the National Bureau of Standards' Center for Building Technology, Model Code organizations, or the proposed National Institute for Building Sciences. The resultant formalized product approval procedures would guarantee uniformity and the objective evaluation of building products.[31]

[31] The Buffalo Organization for Social and Technological Innovation, A Model for an Industrialized Housing Industry in the United States (Buffalo, N.Y.: BOSTI, Inc, n.d.) p. 29.

Testing Procedures. The other related problem in establishing standards for evaluation is the development of uniform, formalized tests for products which allege to meet these standards. Present tests for evaluating compliance with the code are not highly sophisticated and vary widely from state to state. There is no consensus among building officials as to what tests are required for innovative products.

The results of the CES study showed that most states required varying degrees of analysis of fire safety and occupancy requirements; calculations for structural, electrical, plumbing and mechanical systems; site installation and erection procedures; and quality control procedures. In addition, test data records are required for innovative materials or construction techniques. There is little uniformity regarding the degree of detail required in each of these areas, and test procedures are not specified.

Therefore, even if performance criteria were established, the absence of specific testing procedures would still make acceptance of innovative products uncertain. The builder would not know if his test data would be accepted by the building code authorities.

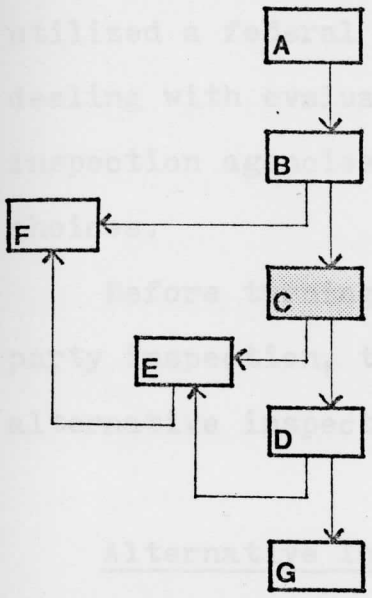
Better methods of evaluation require that proper testing procedures be adopted and standardized. Again, local or state resources are probably not sufficient

to support the development of these procedures. Support would be most likely at the regional or national level. Third party agencies might be the vehicle through which these procedures are enforced. North Carolina, for example, specifies no evaluation standards, leaving this decision to an independent evaluating agency.

Conclusion

In summary, the use of a state agency has had an adverse effect on industry costs by limiting the ability to establish reciprocity programs with other states. The only states that have been able to establish such programs have been states that utilize third party evaluation and inspection agencies. Lack of reciprocity arbitrarily limits the effective market area of a manufactured housing firm. This ultimately influences the social benefits that would otherwise accrue to the community through the availability of lower cost, high quality housing. Firms that do market interstate generally must submit different plans to each state. The costs of drafting these additional plans are eventually passed on to the consumer. Further, third party agencies are more attractive because they are less susceptible to the political influence of local manufacturers.

Evaluation procedures also show potential for improvement. A more widespread use of model codes would positively effect both uniformity and currency of factory-built codes. Improvements in these areas would decrease costs to the industry and increase benefits to the consumer. States should also actively support efforts by Federal agencies and private institutions to establish formal criteria and test methods. Improvements in this area would benefit all concerned by encouraging the development of innovative, cost saving construction techniques.



FACTORY INSPECTION

Following the approval by the evaluating agency of the manufacturer's plans, production of the factory-built home may commence. An inspection agency is required by most states to observe the production process and insure that the homes are being produced according to the approved plans and specifications. In-plant inspections are part of the "quality assurance" program.

Inspecting Agency

The results of the CES survey revealed no consistent pattern in the choice of a single inspection agency. Three states utilized third parties; two states used state agencies; two states provided the option of choosing

from among a state, local or third party; and one state utilized a federal agency. For reasons discussed earlier dealing with evaluating agencies, local and federal inspection agencies are probably less than optimal choices.

Before turning to an analysis of state vs. third party inspection, the propensity for states to provide alternative inspection agencies will be reviewed.

Alternative Inspection Agency Provisions. The options were provided by some states to allow the manufacturer to choose that inspection system which was least costly. However, a manufacturer may choose an agency for reasons other than cost. In most factory housing laws there is a provision for localities to retain exclusive control over some areas (e.g. installation of factory-built housing, zoning, building setbacks, aesthetics, design loads). Some local code officials have apparently used this retained power as a lever to convince the builder to utilize local inspection agencies.[32] The advantages that accrue to the industry by working closely with state agencies might also be related to motives other than cost, as indicated in the earlier discussion of evaluation agencies, page 47 and 48.

[32] "California Factory-Built Housing Law," p. 987.

State and Third Party Agencies

The manufactured housing producers, in contrast to the states, appear to have a clear preference for third party inspection agencies. The Industry Survey showed that two-thirds of the respondents favored in-plant inspection by a third party. Potential for uniformity was mentioned most often as the reason for this choice. (see Table 2)

TABLE 2

INDUSTRY RESPONSES TO QUESTION OF PREFERENCE BETWEEN STATE OR THIRD PARTY INSPECTION AGENCY

Respondents' Comments	Respondents Favoring State	Respondents Favoring Third Party
Better communication with state agency	2	
Lower cost of inspection with state agency	2	
State unwilling to forego inspection responsibility	1	
Better public acceptance with state agency	1	
Miscellaneous comments	3	2
Less political influence with third party		2
Easier and quicker implementation with third party		4
Third party more qualified		2
More uniformity with third party.		5

Source: Reidelbach-Simpson Industry Survey, Fall, 1972

Interstate Reciprocity. Problems of interstate recognition of inspection are similar to interstate recognition of evaluation. The general ineffectiveness of mutual recognition programs increases the costs of marketing manufactured homes interstate.

A weak reciprocity program requires out of state inspections. Almost all states that have a manufactured housing code also have out of state inspection systems. The costs of this inspection, paid for by the manufacturer and passed on to the consumer, have three characteristics. First, it includes payment for the services of the inspector (range is $11 per hour to 0) and all other expenses, fees and travel. Second, a firm desiring to market in several states can expect this same expense for each state in which he markets. Further, states require varying frequency of inspections, with one state requiring the inspection of 100% of all units manufactured. It would be entirely possible for a manufacturer to entertain inspectors from several states at the same time, all inspecting essentially the same thing.

To remedy this situation, stronger reciprocity programs should be developed. If a state inspection agency is to be employed, it is of primary importance to develop better methods of evaluating programs in other states. Qualifications for inspectors should be stipulated

and uniform inspection procedures should be agreed upon at the regional or national level. This might be accomplished through a Federal agency, although it is more likely to be implemented through cooperation among the states by way of programs such as NCSBCS. The use of third party inspection agencies (for example, Underwriter's Laboratory or Pittsburgh Testing) would practically eliminate the problem of multiple evaluation of other states' inspection programs. The major factor restricting the more widespread use of third parties is, again, the states' unwillingness to relinquish traditional sources of power.

Intrastate Considerations. The choice of an inspection agency has somewhat less of an impact on costs and benefits within the borders of a state. However, the responses to the Industry Survey did indicate several areas which are sensitive to the needs of the manufacturer.

Cost of inspection was reported by two respondents of the survey to be lower with a state inspection agency. Although there was no indication of why this occurred, the real costs of inspection programs are sometimes hidden. This occurs when states operate subsidized inspection programs. While the budgets are not broken down in the CES study, three of the states reported that total costs of the entire program were not offset by total fees collected.

Two of the three states predicted that a balance would be reached in the future. In three other states no budget was provided and in one state the budget for the factory-built housing program was not separable from the total building code budget.

Four of the respondents to the Industry Survey preferred third party inspection due to the speed with which such a program could be implemented. This is a positive advantage in those states that do not yet have a factory manufactured housing building code.

Inspection Process

Inspection requirements and methods. The degree of detail of inspection during the production process can significantly affect costs and quality of inspection, particularly if the inspection procedures interfere with production. One half of the respondents to the industry survey reported that inspectors disrupted their production flow.

Most states responding to the 1972 CES study indicated that "all systems" were inspected. However, there was a great deal of variety concerning the method of inspection. All states that had inspection programs utilized visual inspection. However, in some states, physical tests of

during the critical first year or two after the unit has been installed.

A consumer information manual, supplied by the manufacturer at the request of the state, would provide the home purchaser with such an instrument. Sixteen of the twenty-six manufacturers contacted in the Industry Survey already provide home purchasers with an "owner's manual" or information package. Increased consumer response would help the state to determine the effectiveness of its inspection program as well as to determine the reliability of inspection systems in other states.

Inspection Frequency. The frequency with which inspections should occur is also a subject of disagreement. Some states require inspections for every housing unit or component that is produced. The codes in other states refer to "random" or "periodic" inspections.

Table 3 shows the range of frequencies preferred by the manufacturers responding to the industry survey, and the frequencies specified in state manufactured housing codes surveyed in the CES project.

There appears to be a slight preference by both the industry and the states for random inspection. This type of inspection is clearly less costly to both parties. It is less of an administrative burden on the state and results in less interruption of production for the manufac-

TABLE 3

FREQUENCY OF INSPECTION PREFERRED BY THE MANUFACTURED HOUSING INDUSTRY AND REPORTED BY STATES

Frequency	Industry Preference	Reported in State Programs
Daily	5	3
Weekly	4	1
Bi-Monthly	1	0
Monthly	5	1
Random	10	5
Initially 100%, later random	0	2
Other	3	1

Sources: Reidelbach-Simpson Industry Survey, Fall 1972
Sections 3 and 5, State Building Laws, Regulations and Programs, Coordinated Evaluation System Project, National Bureau of Standards, 1972.

turers. However, comments from both the industry and the states suggest that random inspections may not always be preferred in all cases. The rate of production, confidence in the manufacturer by the inspector, the nature of the product or the way it is produced, all affect the required rate of inspection.

A flexible frequency of inspection based on the

past performance of the manufacturer with respect to his own specific product appears to be a good system. California, one state in which this system is used, requires that each of the first ten units or components be completely inspected. If there is good compliance on these first ten units, then only 25% of the units subsequently produced are inspected.

Inspector and Building Official Training Programs. Proper qualification of inspectors plays a significant role in insuring a high quality and low cost housing product. Improved training of all code administrators is necessary if sophisticated, performance-type building codes are to be properly enforced.

According to the CES study, only one out of sixteen states with a manufactured housing building code program had established any type of formal training program for building officials or inspectors. (see Fig. 4) Informal training programs were reported in seven of the sixteen states. Only two of the states surveyed reported the existence of an inspector certification program.

This lack of formal training programs encourages disparate inspection techniques, resulting in non-uniformity of building code inspections. The inconsistency of building code interpretation has been described in other studies as a major factor in preventing uniformity of building code

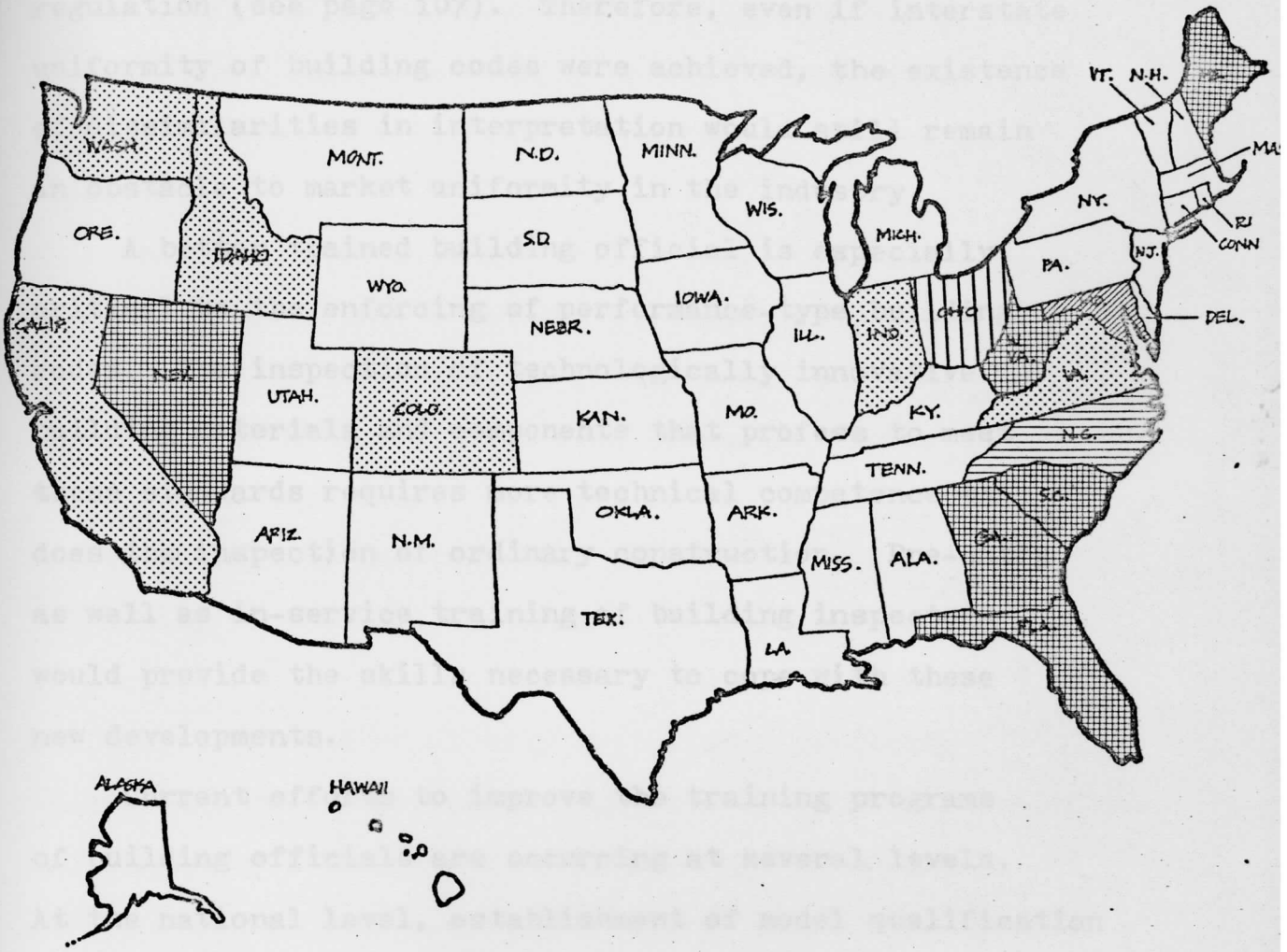


FIGURE 4

TRAINING AND CERTIFICATION PROGRAMS FOR MANUFACTURED HOUSING CODE OFFICIALS

States with neither training programs nor certification programs.

States with informal training programs and no certification programs.

States with formal training programs but no certification program.

States with certification programs but no training program.

States with formal and informal training and certification program.

States not surveyed or with no manufactured housing or building program.

regulation (see page 107). Therefore, even if interstate uniformity of building codes were achieved, the existence of dissimilarities in interpretation would still remain an obstacle to market uniformity in the industry.

A better trained building official is especially critical to the enforcing of performance-type building codes. The inspection of technologically innovative building materials and components that profess to meet these standards requires more technical competence than does the inspection of ordinary construction. Pre-entry as well as in-service training of building inspectors would provide the skills necessary to cope with these new developments.

Current efforts to improve the training programs of building officials are occurring at several levels. At the national level, establishment of model qualification standards (for voluntary use by the States) would achieve a greater interstate uniformity. The Education and Qualification Committee of NCSBCS is presently investigating some of these areas, including qualifications of Code Enforcement Officers, model legislation pertaining to certification of Code Enforcement Officers, and a National Academy of Code Administration. These actions, if productive, will increase uniformity, lead to a larger potential market, and result in greater economies of scale for the industry.

Better qualified inspectors will also encourage a higher quality, less expensive housing product. Ultimately these improvements will result in a lower cost to the consumer.

The few states in which well-organized training programs exist point to several strategies that other states might follow. Indiana requires all building inspectors to attend a three week course at Purdue University. California, at the time of the CES survey, was investigating the extension courses offered by the University of Nebraska in the area of building construction inspection. Other states could follow these examples and take advantage of already established community educational resources, such as private or state universities and community colleges. Maryland, on the other hand, has made use of services offered by the model code agencies to instruct its personnel. Maryland pays the tuition for all building inspectors to attend courses conducted by BOCA and NFPA.

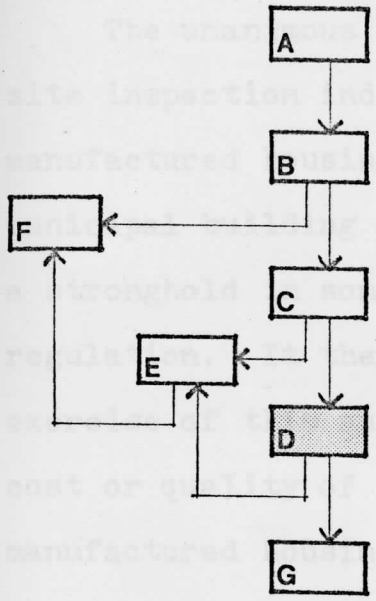
Conclusion

Particularly where interstate performance is concerned, third party inspection agencies probably offer the most potential for effectively and effieiently inspecting

manufactured housing units in the factory. The resultant uniformity improves the ability to establish interstate reciprocity programs. For those states without an existing factory-built code, the utilization of third party agencies offers an expedient, inexpensive and effective way of rapidly establishing a system for enforcing this part of the manufactured housing code.

In developing inspection procedures, it is a difficult problem to establish a reasonable degree of compliance at a cost that does not unduly penalize the industry. Determining what items should be inspected, how they should be inspected, and the frequency with which they should be inspected is dependent upon structuring a balance between the number of deficiencies that occur and the costs of inspection. Consumer feedback (through the use of consumer information manuals) would aid in determining the frequency that deficiencies occur under a given inspection system.

It may be possible for states to establish a flexible inspection system that is sensitive to the performance of the manufacturer. This would give the manufacturer the ability to reduce his costs of inspection (and eventually the cost of the home) as long as his units consistently meet the standards of the code. A system similar to that of California offers the most potential for achieving this goal..



SITE INSPECTION

Site inspection is the final stage at which deficiencies in the manufactured housing unit or component will be discovered by an inspector. It is of particular importance for the inspecting agency to detect any damages that occurred during transport to the site and to insure proper installation on the site.

Agency

On-site inspection is generally within the authority of local municipalities. All of the states responding to the CES study utilized a local inspection agency for on-site inspection. In addition, California requires at least 5% of the installed units to be inspected by a third

party.

The unanimous choice of a local agency for on-site inspection indicates that, although the factory manufactured housing laws have limited the power of municipal building code officials, local authority retains a stronghold in some sectors of manufactured housing regulation. It therefore becomes important that the exercise of this authority does not adversely effect the cost or quality of intra- or interstate production of manufactured housing units or components. Clearly specified inspection procedures are required to define the boundaries of municipal authority. Properly qualified inspectors are required to insure that the inspection procedures are adequately carried out.

Inspection Procedures.

Inspection procedures are expected to detect any damage which may have occurred to the unit during transport, and check the quality of on-site assembly and installation of the unit. To achieve these goals, states usually inspect one or more of the following items: site development, foundations, connections to utilities, and field connections between components. However, there is a great deal of diversity among states (see Fig. 5), with

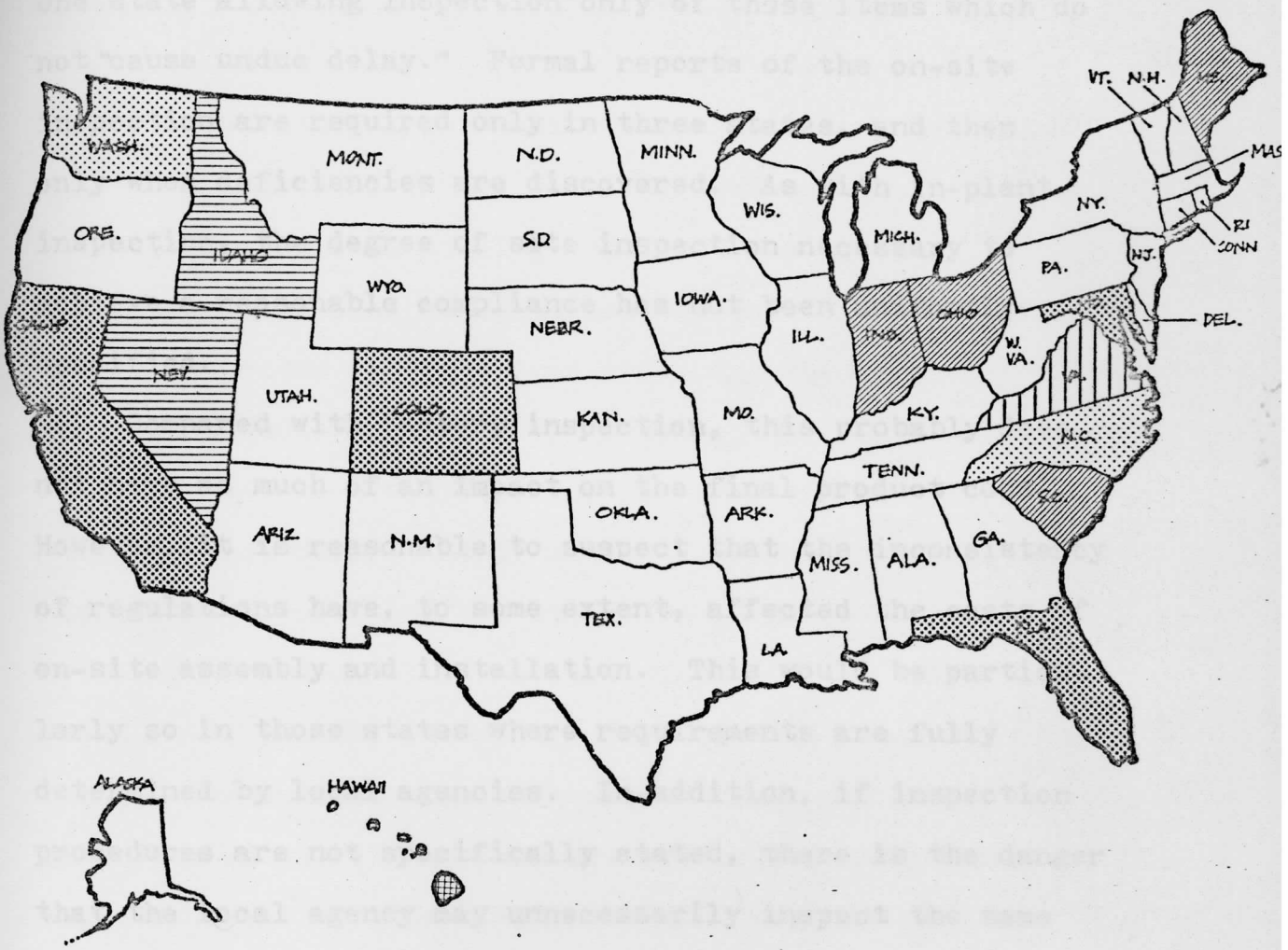


FIGURE 5

ITEMS INSPECTED DURING ON-SITE INSPECTION

- Site development, foundations, connections to utilities and field connections between components.
- Foundations, connections to utilities, field connections between components.
- Site development, connections to utilities.
- Field connections between components.
- All construction.
- Items inspected not specified or determined locally.
- Not surveyed or with no manufactured housing or building program.

one state allowing inspection only of those items which do not "cause undue delay." Formal reports of the on-site inspection are required only in three states, and then only when deficiencies are discovered. As with in-plant inspection, the degree of site inspection necessary to achieve a reasonable compliance has not been uniformly specified.

Compared with factory inspection, this probably does not have as much of an impact on the final product cost. However, it is reasonable to suspect that the inconsistency of regulations have, to some extent, affected the costs of on-site assembly and installation. This would be particularly so in those states where requirements are fully determined by local agencies. In addition, if inspection procedures are not specifically stated, there is the danger that the local agency may unnecessarily inspect the same items that were previously inspected in the factory.

The design of an effective on-site inspection system requires expert technical knowledge as well as an understanding of the relative costs to the manufacturer and benefits to the consumer of each requirement. Furthermore, data on the number of deficient units that are undetected is also required. Again, it appears that providing a consumer information sheet is an essential step in obtaining this data.

Fees

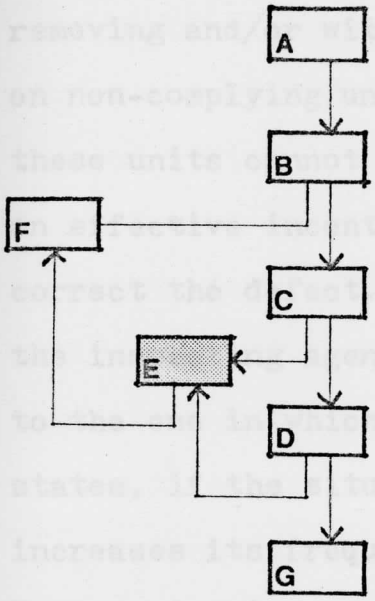
Fees obtained from on-site inspection have traditionally been a source of income for local governments. However, factory manufactured housing requires less on-site inspection than does conventional housing. It would therefore be expected that the fees collected should be somewhat lower.

The responses to the CES study shows that, generally, this does not occur. Local agencies appear to exhibit a resistance to revising the structure of their fees for building permits. Of the states responding to this question in the CES study, six replied that local agencies charged the same fee for both conventional and factory manufactured on-site inspection. Two states responded that the local agencies charged either the same or less; and five states had no information about the local fee structure. Only the State of Washington reported that local agencies were collecting less of a fee for inspecting factory manufactured housing. This practice of charging the same fee unnecessarily increases the cost of the manufactured housing product for the consumer and helps undermine the competitive position of the manufacturer with respect to conventional builders.

Conclusion

In general, many states take little interest in the factory manufactured unit after it has left the factory. Usually local authorities are in full control of all site inspection procedures. This has lead to non-uniformity of site inspection procedures and to increased costs of inspection that ultimately are passed through to the consumer.

The primary potential for improvement here lies in more clearly defining responsibilities of local agencies to prevent multiple inspections. More uniform inspection procedures and fees that clearly reflect costs of local inspection would also decrease costs to the consumer.



ENFORCING PENALTIES

During the manufacturing, assembling and installation processes it is likely that, even with meticulous quality control, some deficiencies will be discovered. Enforcement rules are established to require the correction of these deficiencies before the unit is sold. If enforcement techniques are fair and reasonable, they will protect the conscientious manufacturer from unnecessarily severe and costly penalties. At the same time, they should protect the consumer from the actions of irresponsible manufacturers.

Methods of Enforcement

Practically all states with a viable factory manufac-

tured building code have provisions for immediately removing and/or withholding the certification insignia on non-complying units and components. Without an insignia, these units cannot be legally sold. This, in itself, is an effective incentive for the manufacturer to quickly correct the defect. Additionally, most states also require the inspecting agency to inspect units constructed prior to the one in which the deficiency occurred. In some states, if the situation warrants, the inspection agency increases its frequency of inspection of the manufacturer. The combination of these measures has apparently been sufficiently effective so that further penalties do not usually need to be imposed to insure compliance. Only three out of twenty-four manufacturers in the Industry Survey reported being cited for non-compliance. Two of the deficiencies were due to the interpretation of ambiguous code requirements, and one involved the correction of an oversight.

Other enforcement procedures include revoking certification to produce units (nine out of fourteen states have provisions for this), and - if applicable - revoking certification of third parties (six out of ten states have provisions for this). Only one of the states surveyed by the CES study had made provisions for stop order procedures on the units, the production line, or

the third party inspector.

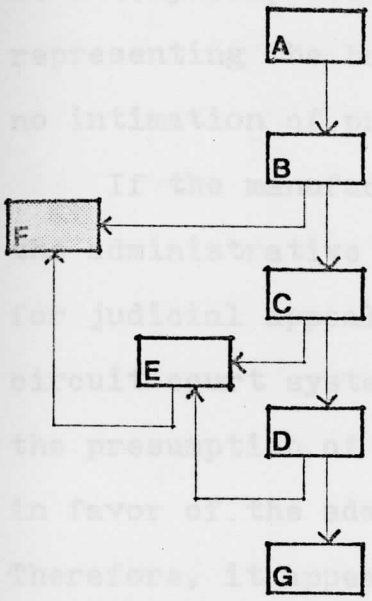
Manufacturers are usually allowed various amounts of time to correct deficiencies before penalties are imposed. Time limits are specified by seven states and range from immediate correction of life safety systems to thirty days. Eight states did not specify a time limit. One of those states, Washington, felt that no time limit was necessary because time works against the manufacturer and not the state.

Failure to correct deficiencies as stipulated in the various codes is usually characterized as a misdemeanor. Two states have not established any penalties, leaving this to the courts to decide. However, in the other states the fines range from a minimum of $50 to a maximum of $1,000 for each violation. Jail sentences of up to thirty days are possible.

Conclusion

The design of an effective penalty system is beyond the scope of this study. But the national trends examined above point to an important element of this system. Practically all of the responding states relied heavily on the removal or denial of insignias as a means of halting sales of deficient units. This procedure is

simple and involves a minimum of costly administrative procedures. It is effective insofar as it prohibits the sale of deficient units to the consumer and provides the incentive for a manufacturer to quickly correct deficiencies.



Appeals

Most states provide an appeal procedure for resolving disputes between manufacturers and the building code officials. The usefulness of those provisions depends largely upon the cost in terms of time and money required for an appeal and the manufacturers view of the impartiality of the appeal procedures.

The lowest level of appeal authority in all states with established appeal procedures and responding to the CES study is through the code administrating agency. As in the case of mobile homes, these agencies usually establish boards of review to rule on the actions of inspectors and plan approval officials. The board of review should

be a body composed of competent personnel and individuals representing the broad public interest. There should be no intimation of prejudice towards the manufacturer.[33]

If the manufacturer has not gained satisfaction through the administrative appeal, most states have provisions for judicial appeal through either the state, county or circuit court system. As in the case of mobile homes, the presumption of validity weighs the judicial procedure in favor of the administrative agency. (see page 116) Therefore, it appears that the potential for improving appeal procedures lies primarily with insuring that personnel involved with the lower level of administrative appeals are technically competent and impartial.

Revisions

Obsolete building codes inhibit the implementation of new innovations. Even the more flexible performance-based building codes require periodic updating to remain effective. Yet, resistance from craft unions and associated industries (e.g., those most threatened by technological change) have been particularly persuasive in limiting the currency of building codes.[34]

Because of a lack of technical ability and personnel,

[33] Douglas Commission, Building the American City, p. 265.

[34] Ventre, Technological Currency, p. 8.

most states and municipalities rely on model codes as a guide for formulating their own codes. The three major model organizations (BOCA, ICBO and SBCC) annually revise their codes.[35] Yet, the conclusion of the Douglas Commission states that only about 15% of the municipalities above a population of 5, 000 had in effect a model code that was reasonably current, and about 85% either had no code, did not use a model code, or failed to keep the code up to date.[36] This situation has a tendency to diminish the likelihood of technological innovation. Moreover, the states' use of different editions of the same model code obstructs the uniformity that would result if the state utilized the same edition.

To correct this situation, factory manufactured housing legislation should state that revisions must be made through administrative rather than through legislative action. Further, the code agency should have statutory responsibility to adopt the most modern technology available. The adoption of model code amendments should be mandatory, regular and automatic, rather than optional.

TECHNICAL ASPECTS OF MANUFACTURED BUILDING CODES

Prospects for a National Code.

Unlike mobile homes, factory-manufactured housing is not regulated by a "national," comprehensive model code. Standards are instead divided separately into those regulating electrical requirements, plumbing requirements, mechanical equipment, and building construction. Most states rely heavily upon model code agencies (e.g. ICBO, SBCC, and BOCA) for the technical development of these Codes (see Table 4). Of twenty-one states with viable factory manufactured regulations, only seven did not refer directly to one of the three major model code agencies. In all categories, except electrical requirements, the Uniform Building Code achieved the widest recognition. The National Electric Code most nearly approximates a "national" code, with only four states referring to other electrical standards.

The profusion of model codes holds some promise for increased uniformity. As stated earlier, recommendations for uniformity proposed by the Model Codes Standardization Council of NCSBCS have a good chance of being accepted by at least the three major model code agencies. If all states would adopt one of these three model codes, substantial national uniformity may be

TABLE 4

NUMBER OF STATES REFERRING TO EACH TYPE OF MODEL CODE

Type of Code	Number of States
Electric Codes	
National Electric Code	17
State Electric Code	3
HUD/FHA Electric Standards	1
Plumbing Codes	
Southern Plumbing Code	3
Uniform Plumbing Code	8
Basic Plumbing Code	3
State Plumbing Code	4
ANSI (National) Plumbing Code	2
HUD/FHA Plumbing Standards	1
Mechanical Codes	
Southern Mechanical Code	1
Uniform Mechanical Code	8
Basic Mechanical Code	4
State Mechanical Code	7
HUD/FHA Mechanical Standards	1
Building Codes	
Southern Building Code	2
Uniform Building Code	8
Basic Building Code	5
State Building Code	5
HUD/FHA Building Standards	1

Source: CES survey.

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Southern Mechanical Code	1
Uniform Mechanical Code	8
Basic Mechanical Code	4
State Mechanical Code	7
HUD/FHA Mechanical Standards	1
Building Codes	
Southern Building Code	2
Uniform Building Code	8
Basic Building Code	5
State Building Code	5
HUD/FHA Building Standards	1

Source: CES survey.

achieved. The least that would occur would be increased uniformity at the regional level.

Occupancies Covered by Manufactured Housing Laws

Manufactured building programs are by no means limited to only the regulation of housing. The laws in nine states include all forms of factory manufactured construction, two states include institutional and residential building types in their regulations, and in thirteen states only residences are covered. The potential for increasing innovation and decreasing the rapidly accelerating costs of construction might be realized if manufactured building programs in all states were extended to all forms of construction. This is particularly important in view of the fact that manufactured building components and subsystems are becoming targets for investment by major corporations.[35]

Technical Adequacy of Manufactured Building Regulations

As previously stated, practically all factory manufactured housing laws are based on model codes of some type. Therefore, to determine the adequacy of

[35] Ronald Levy and D. Elliott Wilbur Jr., Opportunities in Building Components and Subsystems (Cambridge, Mass: Arthur D. Little, Inc., 1972) p. 6.

the manufactured housing codes, one would have to investigate the origins of the requirements cited in the model codes.

In New York State, the technical requirements of the New York State Factory Manufactured Housing Code are based on the New York State Building Construction Code applicable to One- and Two-Family Dwellings. This code was first promulgated on November 1, 1951 and has been generally accepted as being adequate. The one exception is in requirements for energy usage, which do not exist in either the state code or the other model codes that apply to conventional construction.

Energy Conservation Requirements

The increased cost and decreased availability of energy supplies in the United States has been the major force behind the drive for energy conservation standards for buildings. The operation of buildings accounts for approximately 33% of all energy used in this country. It is generally acknowledged that substantial savings in energy could be achieved by establishing an adequate energy conservation building code.

The closest to a national standard for insulation in residences are the Federal Housing Administration's (FHA) Minimum Property Standards, recently revised in

1972. Additionally, ANSI A119.1 (1972) Standard for Mobile Homes had included heat loss requirements as early as 1969.

The most recent attempt at formulating a nationwide, performance-based energy conservation standard was initiated by the National Bureau of Standards at the request of NCSBCS.[36] However, as previously described, the problems in writing as well as enforcing performance standards made the document impractical for immediate use. Thus, it was recommended that FHA's Minimum Property Standard 51b be used as an interim standard while a consensus standard was developed for housing (as well as factory manufactured housing). It is in the interest of the states as well as the factory manufactured housing industry to adopt this model, nationwide energy conservation building standard that will emerge. If each state were to legislate or promulgate its own separate energy standards, the efforts of the model code agencies to arrive at uniform requirements would be set back and the ability of the manufactured housing industry to market interstate would be reduced.

[36] U.S., Department of Commerce, National Bureau of Standards, Design and Evaluation Criteria for Energy Conservation in New Buildings. Washington, D.C.: Government Printing Office, February 27, 1974.

PART III.

BUILDING CODES FOR MOBILE HOMES

INTRODUCTION

It is estimated that approximately 43 states currently have a mobile home building code, usually based on the American National Standards Institute's ANSI A119.1 Standard for Mobile Homes. The development of this national mobile home code is a relatively recent phenomenon, and is described in detail in a later section.

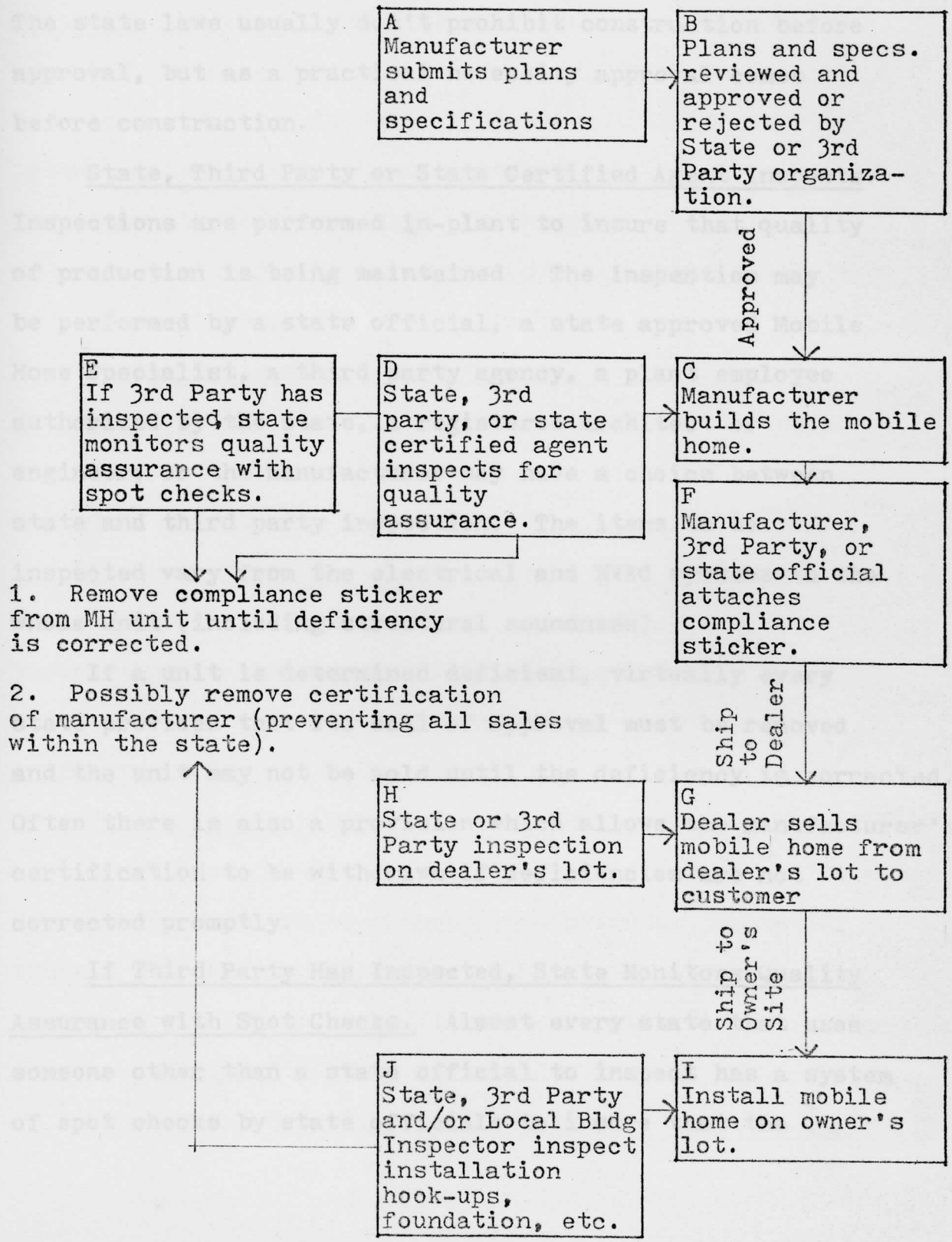
The flow chart on the following page (see Fig. 6) outlines the general steps that occur during the certification and inspection of the manufacturer's product. These are briefly explained below.

Manufacturer Submits Plans and Specifications. This step occurs in most of the states, though the amount of detail and types of information to be submitted varies greatly. In some states very detailed plans and calculations for heating, ventilation and air conditioning systems (HVAC), electrical systems, plumbing, etc., are required in multiple copies alone with a registered architect's signature. Others require very little, with one state requiring no plans, relying on the good judgement of the manufacturer and later spot checks to insure that systems are functional.

State or Third Party Agency Reviews and Approves Plans. Most states have a mobile home department or architecture division which reviews and approves or rejects the manufacturer's plans and specifications. A number of states in the South Atlantic region use third parties for this procedure.

FIGURE 6

FLOW DIAGRAM OF CERTIFICATION AND INSPECTION PROCESSES



Manufacturer Builds the Mobile Home. The manufacturer with his plans approved can now build his mobile home. The state laws usually don't prohibit construction before approval, but as a practical necessity approval comes before construction.

State, Third Party or State Certified Agent Inspects. Inspections are performed in-plant to insure that quality of production is being maintained The inspection may be performed by a state official, a state approved Mobile Home Specialist, a third party agency, a plant employee authorized by the state, a registered architect or engineer; or the manufacturer may have a choice between state and third party inspection. The items to be inspected vary from the electrical and HVAC systems to the whole unit (including structural soundness).

If a unit is determined deficient, virtually every state provides that its seal of approval must be removed and the unit may not be sold until the deficiency is corrected. Often there is also a provision which allows the manufacturer's certification to be withdrawn if deficiencies are not corrected promptly.

If Third Party Has Inspected, State Monitors Quality Assurance with Spot Checks. Almost every state that uses someone other than a state official to inspect has a system of spot checks by state officials to insure that the

third party inspector is doing an adequate job.

Manufacturer, Third Party, or State Official Attaches Compliance Sticker. Adhesive stickers or metal tags are attached to the units to show compliance with the mobile home code. The manufacturer buys the sticker or tag, and either attaches it to the unit himself or has the production inspector attach it for him. The sticker or tag is matched up with the serial number of the mobile home and the state keeps the records on this.

Dealer Sells Mobile Home From the Dealer's Lot to the Consumer. The manufacturer ships most of the completed mobile homes to the dealer; these will sit on the dealer's lot until sold to the customer.

State or Third Party Inspection. Many states provide for another inspection of the unit on the dealer's lot to insure that the unit hasn't been tampered with or become defective during transport to the dealer and that no unapproved units are being sold.

Dealer Installs Mobile Home on Owner's Site. The mobile home is shipped to the owner's site and is installed there. Usually the unit can be brought into place by the towing truck. Once in place, utility connections must be hooked up and, depending on local regulations, other improvements (such as skirting) will be installed.

Inspection of Installation, Hook-ups, Foundation, Etc.

The same state or third party inspector that inspected the unit at the dealer's lot may inspect it again on site to insure that transport of the unit hasn't impaired any of its systems. Though most mobile home codes have preempted local codes, the local building inspector usually has the responsibility to insure that foundations and utility hookups are properly installed. Often they also have jurisdiction over any damage or modifications made to the units after the certification sticker was applied. Deficiencies noted by the local inspector are reported to the state for state action.

MOBILE HOME REGULATION - INTRASTATE CONSIDERATIONS

State Adoption of Mobile Home Codes

The presence or absence of statewide standards for mobile home construction within a state is a primary concern of manufacturers. In the states which have adopted no statewide standards, mobile home manufacturers seeking markets are faced with many sets of rules and regulations established by community governments within the state. One method of escaping the maze, to take advantage of assembly line mass production methods in such states, is to design and build all units to meet the strictest of the code requirements in the market area. This approach necessarily increases unit costs throughout the area, if it can be used at all. Some communities may still require that their own inspectors check wiring and plumbing before they are hidden by wall coverings. Requirements set by one community may be in direct conflict with those set by others. Although in most states there are at least some areas with no building codes at all, such communities are generally small and scattered, and hardly provide the kind of mass market necessary to make large scale production and its attendant economies feasible. Moreover, codeless communities are likely to attract opportunistic sellers of

low-quality units - a situation which may not only reduce the immediate market for quality mobile homes, but may also contribute to the kind of low public opinion of the industry that has for so long hindered its growth.

Most manufacturers of mobile homes intend to market quality products. Most manufacturers of mobile homes favor state adoption of mobile home construction standards, not merely to simplify their private code problems, but also to assure at least minimum product quality for the industry as a whole. Industry associations have been among the most influential forces in bringing about state legislation in the field.

The current edition of the code which MHMA sponsored has been adopted or modified as the basis for state regulation in 43 states. As has been noted, state mobile home regulation is for the most part a very recent phenomenon. Drafting a code involves analysis of construction types, determination of needs, and setting of appropriate and usable standards. It can be a very expensive undertaking. There are a number of groups (BOCA,SBCC, ICBO, et.) which supply model code materials in the conventional home-building field, but A119.1 is the only model code directly applicable to mobile homes. A committee or legislature which has agreed upon the need for a statewide mobile home building code has, essentially, only two choices: Adopt A119.9 or spend the time and money

to draft its own code.

The high frequency of state acceptance of A119.1 is auspicious for a number of reasons. First, it eliminates the wasteful and confusing duplications of efforts in analysis and drafting that characterizes the system of conventional building code regulation. Although the alternative - widespread independent local code drafting or evaluation and adoption of a number of different model codes - may result in some new discoveries and the correction of code flaws, the costs are surely not worth the effort. While the on-site residential building industry has exhibited characteristics of technological stagnation and increasing costs, the mobile home industry has been marked by innovation and cost reduction.

Moreover, in contrast with many conventional codes, A119.1 is designed to be a performance code rather than a specifications code. This, plus the regular updating of code provisions, is another major reason for the relatively high level of innovation in the mobile home industry.

Finally, it is a comprehensive code. All aspects of mobile home construction are treated as an integrated whole. Most model codes treat potentially hazardous aspects of construction individually - wiring, waste disposal, framing methods - and provisions are not necessarily completely compatible. Such treatment demands that

provisions be applicable to all types of use, and may set standards above those necessary for a particular use. A119.1 is the one model construction code that is directly aimed at a whole system.

An unfortunate aspect of state adoption of A119.1 has been an unwillingness to legislate automatic adoption of the most current version of the code. Of the states surveyed in the CES study whose statewide mobile home building codes were essentially consistent with A119.1, legisaltion in only four provided for regular updating of the codes in conformity with A119.1 revisions. Only two other states appeared to update regularly through administrative action or frequent amendments, and there is no guarantee that these two states will continue to update.

The writers of A119.1 have made every effort to write a "performance" type code. Nonetheless, financial, technical, and conceptual limitations still leave pure performance codes in the realm of wishful thinking. Innovation does not necessarily fall within neatly defined and standardized categories. Even the best methods of evaluation cannot be so comprehensive that they will meet all future needs. Frequent reviews and revisions are essential.

If patterns of model code use in the mobile home area follow those that have been observed in the conventional building code area, the outlook for real uniformity is

bleak. The Census Bureau study of conventional building codes for the Douglas Commission showed that only 28% of model code community governments surveyed had adopted 90% or more of the changes recommended nationally during the previous three years.[37] Only fifteen percent of municipalities and townships above 5,000 in population had a conventional model code that was reasonably up-to-date, although forty-two percent had originally adopted codes which "substantially incorporated" a national or regional model code.

The trend toward widespread state adoption of compatible mobile home codes is clearly a step in the right direction, but unless the codes remain consistent, the gain will be lost. The trend toward consistency in today's legislation can easily be overwhelmed by the kind of local political pressures which produced the chaos in regulation of conventional housing construction. A119.1 is updated regularly; that is, a ready-made method of assuring currency and consistency is available. States should capitalize on this readily available potential by legislating automatic adoption of revisions to the mobile home code.

[37] Douglas Commission, Building the American City, p. 257.

Establishment of Administrative Machinery

Program Funding and Fee Structures. Most states adopting Mobile Home codes do so with the understanding that eventually the fees charged to manufacturers and dealers will offset the administrative costs of running the program. The costs are usually not offset during the first phase of the program, but will level out after a year or so.

The CES survey's data regarding funding is not complete enough to permit patterns or broad generalizations to be developed. Many of the states responding were just establishing a program of funding, or were unable to separate the funding of their mobile home activities from other activities within the same department. Of those providing a usable response half said their fees now offset their costs, half said they didn't. A few states reported that fees provide a surplus of as much as $100,000 over expenses. The amount of money given to the mobile home programs ranges from none to $900,000. States reporting less than $50,000 in funding per year generally had incomplete inspection and certification programs.

Fees charged are comparable among states. Most states charge a sticker fee of $5-$10 for insignia for each unit produced. In addition, there are usually product or plant certification fees that range from $20-$30 per model

to be approved to almost $1000 for model and plant approval.... There is usually an inspection fee of about $25 per unit inspected, or $11 per hour. There may also be a manufacturer's license fee, out of state per diem, and other fees.

It is not possible with the data obtained to say how much funding is enough or what fee structure is appropriate. It is clear, however, that insufficient funding will result in poor inspections and bad quality control. The impact of an inappropriate fee schedule is probably much less since the consumer and public pay the cost, either through direct pricing or through taxes. The primary potential here for improvement lies in adequate funding and staffing. If the state will adequately staff its inspection and certification departments (or adopt a third party system that would minimize costs to the state), the public can expect more reliability and greater standardization of quality in the units produced. And adequate funding (pegged against a realistic fee schedule) will more equitably pass the costs on to the user rather than the public as a whole.

Administrative Agency Enforcing the Mobile Home Code. The state may assign the enforcement of the mobile home code to any of a number of different state agencies. There isn't any national or regional pattern to how this is done. It seems to depend on the particular structure of the state government, what manpower and expertise is available

in each existing agency, and how the function of the code is viewed by the legislature and staffing department.

The agency most often used for administering the code is the commerce department, but even this agency is used by only five states. Of thirty-six states reporting to the MHMA in October, 1972, there were nineteen different agency types administering the codes. These included departments of commerce, industry, labor statistics, insurance, health, fire marshall, public works, architecture, motor vehicles, law enforcement, community affairs/development, construction code committee, and many others.

It is difficult to conclude what effect the type of agency used will have on the way in which the code is enforced. Further data is needed before hard conclusions can be drawn. It can be stated, however, that if an agency allows its functional nomenclature to determine how it views the mobile home, either the industry or the consumer or both will suffer. For example, if a state fire marshall's office is responsible for enforcing the code and views the code primarily in terms of fire prevention and its attendant structural concerns, the mobile homes which have non-fire related defects may be missed when inspected for fire problems and this may well cause unnecessary production line down-time, increase expenses to the manufacturer and, ultimately, to the consumer. An effective administrative agency must

balance the needs of safety and economy carefully to accomplish an optimum result.

It is doubtful if this condition of diversity of administrative agencies can be improved by any means now available. There is insufficient understanding of the effect that the type of agency has on its enforcement, and there is little ability to force the state to use a particular agency to do the enforcing. The potentials for improvement in this area are very limited.

Code Revisions. The necessity for regular code revision has been discussed above. The power of administrative officials to revise the code they are employed to enforce depends upon the provisions of the state's enabling law. Officials of only one of the surveyed states were clearly revising regularly through administrative channels. Although there is some indication that in a number of other states units are being accepted only if they comply with the most current version of A119.1, the technical legal basis for such approval is not generally clear. The outlook for maintenance of at least the current level of code uniformity may be better than is indicated by the present non-currency of many state codes. The problem remains, however. Regular updating generally depends upon the attitudes of administrative personnel, and is in no way assured as it would be if updating were required by law. The potential impact of

local political pressures on code content is obviously much greater when decisions are made by state officials than when made by a national code-writing group whose work is subject to approval by a diverse membership. Local interests and a lack of consideration of aggregate effects of local decisions are primary causes of the chaotic system of conventional code regulation. Granting administrators the option of updating or not is a less than optimal solution to the problem of maintaining up-to-date codes.

State Vs. Third Party Inspection. States which have passed mobile home codes use several different methods of inspection. Of the 17 states that had viable mobile home inspection programs, surveyed by the CES study, seven had state inspection, eight used a third party, and two gave the manufacturer a choice between state and third party inspection. (see Fig. 8)

The use of third party inspection is more common in the South Atlantic states than anywhere else in the country; every state surveyed in that region uses a type of third party inspection system, while only four of the remaining 13 states have any third party provisions. It is also notable that the type of third party inspectors used varies considerably from state to state. The most common method uses widely recognized testing agencies, particularly Underwriters' Laboratories. Other states use a registered

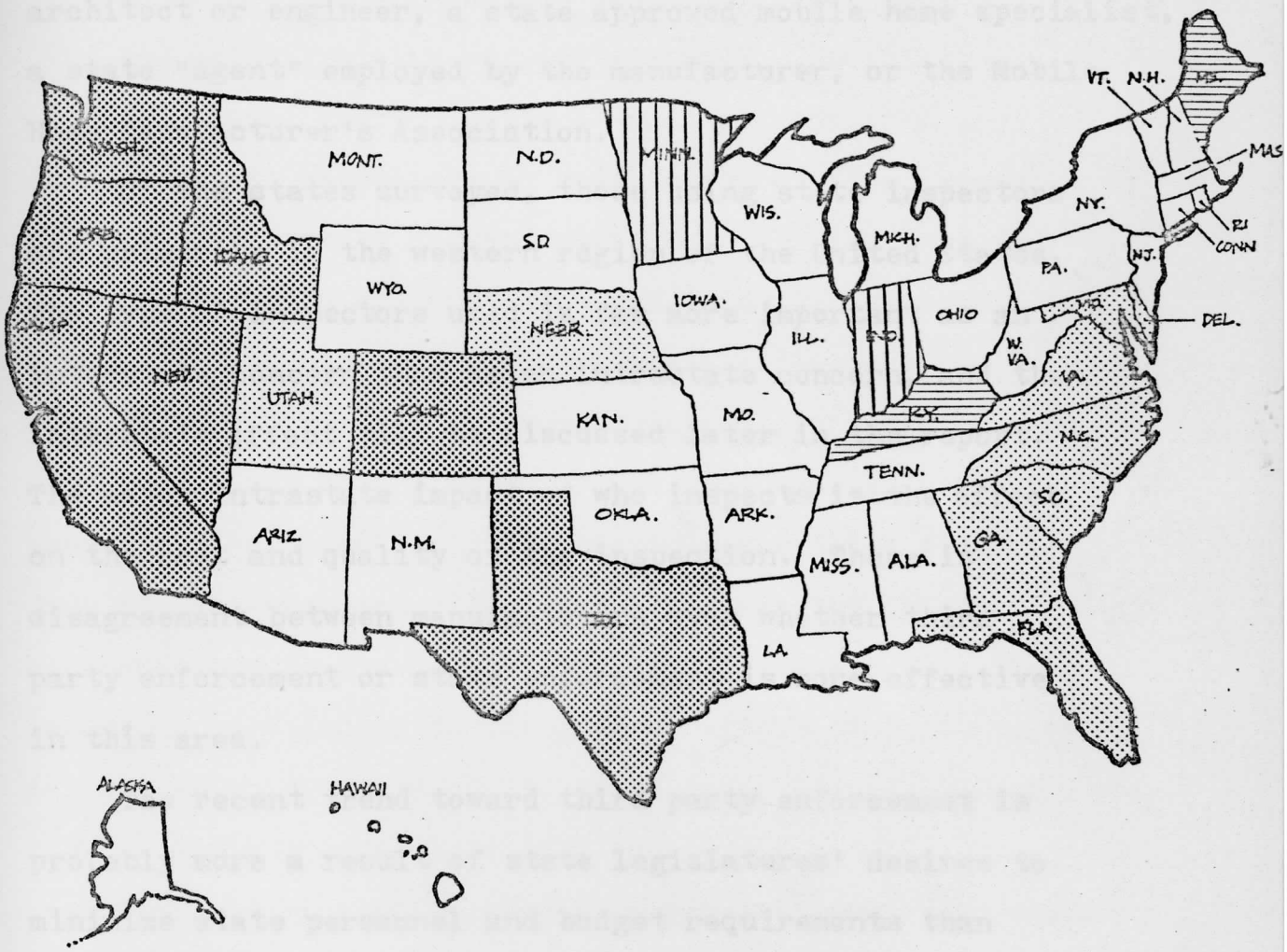


FIGURE 7

TYPE OF IN-PLANT INSPECTION PROGRAMS USED

- Third Party Inspector
- State Inspector
- Manufacturer chooses state or third party inspector
- No viable inspection program
- State not surveyed

architect or engineer, a state approved mobile home specialist, a state "agent" employed by the manufacturer, or the Mobile Home Manufacturer's Association.

Of the states surveyed, those using state inspectors are primarily in the western region of the United States. The type of inspectors used is far more important as an interstate concern than as an intrastate concern, and the interstate effect will be discussed later in the report. The major intrastate impact of who inspects is the effect on the cost and quality of the inspection. There is disagreement between manufacturers over whether third party enforcement or state enforcement is more effective in this area.

The recent trend toward third party enforcement is probably more a result of state legislatures' desires to minimize state personnel and budget requirements than manufacturers' pressure in that direction. While some multi-state manufacturers have gone to third party inspections, a sizable number still favor state inspections as a good way to maintain state control that is sensitive to manufacturers' needs.

The real potentials of third party inspection in improving the industry's performance appear when units from one plant are shipped to several states, and the impacts and potentials of third party inspection are dealt with in

the interstate portion of this section.

Inspector Training and Certification. A 1965 study of conventional codes[38] in the Detroit metropolitan area indicated that variations in code interpretation by code officials do more to prevent uniform regulation than does diversity of code and ordinance provisions. A second study drew a similar picture: "Even where a model code has been adopted over a relatively large number of jurisdictions or relatively wide area with no or few amendments, local inspectors often interpret the code in a way which differs from the language and often even more from the interpretations of inspectors in the neighboring city or suburb."[39] There can be no question as to the general effect of training or certification programs on the consistency of code interpretation - consistency will be improved.

There is no readily available way to compare the costs of state training and certification programs with their benefits. Except for some conflicting manufacturers' comments on the abilities of state mobile home inspectors, there is no basis for evaluating the qualifications of inspectors. However, some general comments can be made.

Inspectors need to know at least what to look for and where to look. Wages paid to inspectors who are not at least this qualified are wasted totally. Some manufacturers

[38] Public Administration Service, Study of Local Building Codes and their Administration in Southeast Michigan Six-County Region. (Detroit: Metropolitan Fund, Inc., 1966)

[39] Douglas Commission Report, p. 260.

indicate that at least in some regions there is such waste, and that even at the most elementary level, training could be worthwhile. Efficient methods of inspection must be used. State inspection fees become only a minor part of inspection costs incurred by manufacturers if lines are held up unnecessarily by inefficient inspection techniques.

Effectiveness, uniformity and efficiency are the obvious and worthwhile benefits of inspector training. Yet of the twenty-one states surveyed in the CES study, only two required that inspectors undergo formal training, and only two others had any kind of formal certification program for inspectors. Three states indicated that they used "informal" training methods, but neither the meaning nor the impact of such programs is at all clear. Thirteen states had neither training nor certification programs for inspectors.

If all costs of inspection, including training costs, were passed on to consumers of mobile homes, it is conceivable that increasing training expenditures could reduce the purchase price of a mobile home and at the same time assure better quality. Efficient inspection techniques can promote the cost savings of efficient production techniques, and have the potential to eliminate costs which would otherwise be passed on to consumers.

Functions of the Administrative Machinery

Certification of Manufacturers' Plans. The states use certification of the manufacturer's plans for his mobile home as a means of assuring mechanical and structural soundness, fire safety, etc. The amount of detail, types of plans submitted, approval agency and other factors vary from state to state.

The pattern of approval agencies resembles the pattern of inspection agencies, (see Fig. 9) since functionally they are closely related. Third party certification is most common is the South Atlantic, while state certification predominates in the West. There are also variations on this pattern: Florida allows any registered architect or engineer to approve the manufacturer's plans; Nevada accepts other states' certification but doesn't certify anything itself; and Minnesota and Indiana allow the manufacturer to choose between state and authorized third party certification.

The amount of detail to be submitted varies from whatever themmanufacturer already uses in constructing his units to new plans drawn by a registered architect, including calculations, stress loading diagrams, etc. There is no clear national or regional pattern to this.

There is a trade-off between cost and benefit received in certification: The more detailed the plans submitted must be, the greater the confidence in the unit's

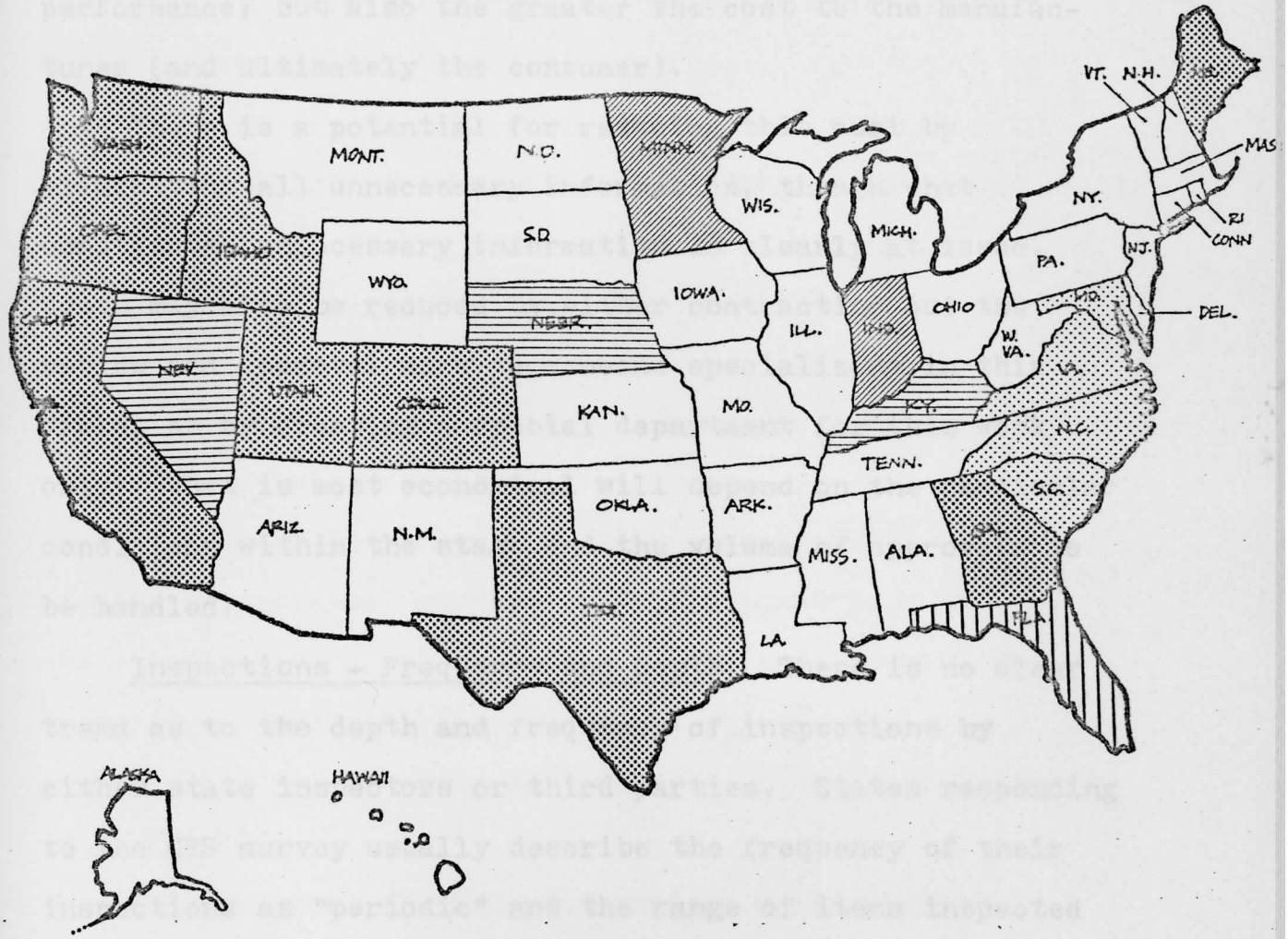


FIGURE 8

AGENCY CERTIFYING MANUFACTURERS' PLANS

- State agency
- Third party agency
- Registered architect or engineer
- Manufacturer chooses between state and third party agency
- Inoperative certification program
- Not surveyed

performance; but also the greater the cost to the manufacturer (and ultimately the consumer).

There is a potential for reducing this cost by eliminating all unnecessary information, though what constitutes unnecessary information is clearly at issue. Costs may also be reduced by either contracting out the review and approval work to someone specializing in this field, or by creating a special department for this work only. What is most economical will depend on the particular conditions within the state and the volume of approvals to be handled.

Inspections - Frequency and Depth. There is no clear trend as to the depth and frequency of inspections by either state inspectors or third parties. States responding to the CES survey usually describe the frequency of their inspections as "periodic" and the range of items inspected as "all systems." There is doubtless great variety hidden behind these responses.

Few things can be said about the present system in any state without knowing what level of defieient units are presently being produced and escaping the inspectors' detection. Such data is not available at this time.

An ideal inspection system must be thorough enough to keep deficient units being issued to the public at an acceptably low level, but not spend unnecessary funds on

that task. It is sufficient here to state that a well designed model inspection system uniformly applied in each state would have the potential of reducing costs in those states which are now over-inspected, and improving quality in those states presently under-inspected.

On-site Inspections. Most states with operational mobile home codes see a final inspection of the unit before occupancy as desirable. This is the last point at which deficiencies resulting from construction or transport of the unit can be corrected. Of 16 states (with operative inspection programs) surveyed by CES all but four have a state inspection on site. Six of these have local inspectors check utility connections and foundations; six others allow the locality to inspect or not, as it sees fit. (see Fig. 10)

The frequency of these inspections varies greatly. A few states have specific frequency requirements (e.g., 10% of all units; or 1000 units per year); others inspect "periodically", which probably means they inspect as many as they can as often as possible with the personnel they have.

As with in-plant inspections, it appears necessary that experts in the field design a program that provides reliable quality without wasting manpower and monetary resources. It would also be desirable that local inspectors be trained to inspect well in a specifically limited area

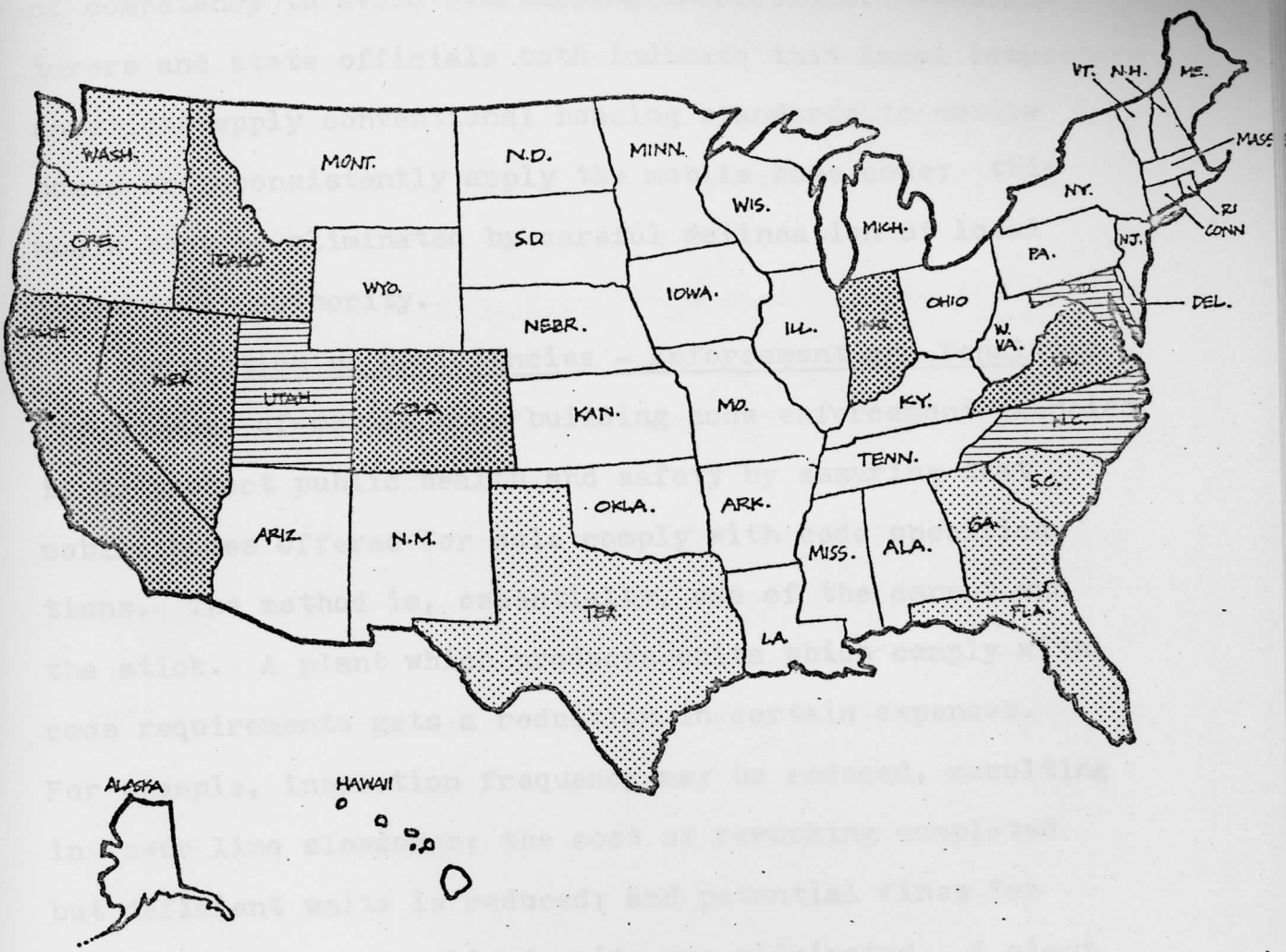


FIGURE 9

TYPE OF ON-SITE INSPECTION SYSTEM

State or third party inspects major systems; local inspectors inspect connections and foundations.

State or third party inspects major systems; local inspectors not required to inspect.

No state inspections; local inspectors inspect connections and foundations.

Not surveyed or no functioning program.

of competency to avoid overlapping inspections. Manufacturers and state officials both indicate that local inspectors sometimes apply conventional housing standards to mobile homes or inconsistently apply the mobile home code; this would best be eliminated by careful delineation of local inspectors' authority.

Correction of Deficiencies - Enforcement and Penalties. The purpose of mobile home building code enforcement agencies is to protect public health and safety by assuring that mobile homes offered for sale comply with code specifications. The method is, essentially, use of the carrot and the stick. A plant which produces units which comply with code requirements gets a reduction in certain expenses. For example, inspection frequency may be reduced, resulting in fewer line slowdowns; the cost of reworking completed but deficient units is reduced; and potential fines for production of non-compliant units are eliminated. A plant which is found to be producing many deficient units will be subjected to increased frequency of inspection, increased necessity to rework completed units, fines, and possible loss of certification to produce units for sale in the state.

In structuring compliance enforcement methods a balance must be found. The effects of a given method of enforcement must be measured against the costs, in terms of both

manufacturer expenditures on quality assurance programs and state expenditures on inspection. If a manufacturer must merely rework and bring up to standards those units inspected and found deficient, his expenditures for quality assurance may be expected to be less than they would be if penalties were automatically imposed, though the imposition of penalties would provide an incentive to improve quality. On the other hand, requirements for imposition of stiff fines and increased intensity of inspection following discovery of deficiencies may, even in the absence of corruption, lead inspectors to relax the thoroughness of routine inspections. An experienced inspector will realize that even the best quality assurance cannot be perfect, and it is a recognized characteristic of administrative bodies that personal ideas of justice influence the behavior of personnel.

Excessively strict code enforcement involves, essentially, criminalization of behavior which is usually accompanied by no criminal intent and which is frequently unavoidable. On the other hand, lax enforcement or minimal penalties can cost dearly in consumer safety. Specific recommendations for enforcement techniques and degrees of penalty are beyond the scope of this study. It is clear, however, that the failure of several states, which have enacted mobile home construction statues, to allocate funds for

enforcement and to provide an effective and fair penalty system, is a condition which needs to be remedied.

Appeals. It is generally within the power of administrative agencies, including those empowered to enforce mobile home construction codes, to establish quasi-judicial units to hear and rule upon questions concerning the decisions of agency personnel such as inspectors or plan approval officials. Moreover, except under very special circumstances, aggrieved parties must rely upon administrative appeal machinery to resolve their grievances. The presumption of expertise that courts grant to administrative bodies may be extended this far. Finally, when and aggrieved party has gone through all administrative methods for obtaining relief but is still unsatisfied, his chances for success in a court of law are strictly limited by the presumption of validity which may be granted to the decisions of administrative appeals officials.

For example, if a manufacturer is unable to obtain initial approval of plans for production of a unit using innovative construction techinques, he must usually appeal within the administrative framework. Failure to obtain approval on administrative appeal may leave open the opportunity for judicial appeal. However, the presumption of validity is likely to lead a court to uphold the administrative decision even if code administrators in a

neighboring state have approved the plans under an identical code. The structuring of the particular appeals system within a given state is thus outweighed in importance by the qualification and abilities of the personnel involved.

MOBILE HOME REGULATION - INTERSTATE CONCERNS

Mutual Recognition Program and Reciprocity

Despite the general trend toward standardization in state mobile home code provisions, a number of code problems still face manufacturers seeking regional or national markets. States which allow sale of units inspected and passed by officials of neighboring states appear to be in a minority. Of the twenty-one states in the CES survey, only sixteen indicated that they had provided for establishment of mutual recognition of inspection programs. Of these, only four indicated that they had actually allowed sale of units inspected by officials of other states.

State acceptance of third party inspection on a regional and national level is of course the most practical way to achieve uniform, widespread code application. The desire of state officials to maintain independence in rule-making power may be the biggest obstacle to achieving a uniform code.

Out-of-State Inspection Systems

Mobile Home Plan Certification. The present pattern of plan certification methods has already been explained. Non-uniformity of the certification process has its greatest impact on interstate production and marketing. For example, a manufacturer producing three models to be shipped into twenty states may have to draw up and submit sixty different sets of plans, and if the three models are changed the following year, he may have to repeat the the process. Not only are approval fees high, but architects and engineers must often be used to draw the plans, adding another large expense.

Non-uniformity of plans to be submitted was mentioned by 20% of the major maunfacturers contacted in a recent telephone survey (Fall, 1973) conducted by this study, as the single factor they would change to best help the industry. In the above example, a uniform system of approval of plans would permit the manufacturer to accomplish the same goal with only three sets of plans instead of sixty, though copies would have to be submitted to each state.

There are two major potentials in this area that immediately stand out. First, a uniform system of plans to be submitted would reduce paperwork requirements for the manufacturer. This could be accomplished if a major national

code or advisory group (such as NCSBCS) would propose a model certification "paperwork" system and apply pressure to have all of its member states adopt the proposal. A second potential which assumes greater state cooperation is to have a reciprocity agreement on plan certification (as Nevada now does) such that plans approved in one state are automatically acceptable in other states. This would require that plans be evaluated in the same way by each state or that an independent body such as Underwriter Labs evaluate all plans from every state.

Materials and Component Approval. Most states have some system for approving innovative methods and materials to be used in mobile home construction. The most common method is to accept the approval listings of national code associations and testing companies. Of 19 states with viable mobile home programs surveyed by CES, 16 use such approval listings, either directly or after state testing. Some states reserve the right to put certain restrictions on code association or national testing laboratories' approved materials. A few states restrict which code associations' listings will be accepted. Nevertheless, it is clear that states put heavy reliance on code associations and testing laboratories for their own materials approval programs.

The strongest impact of such programs is felt by materials suppliers. For example, if you produce plastic pipe, it is far easier to get a national code association to approve

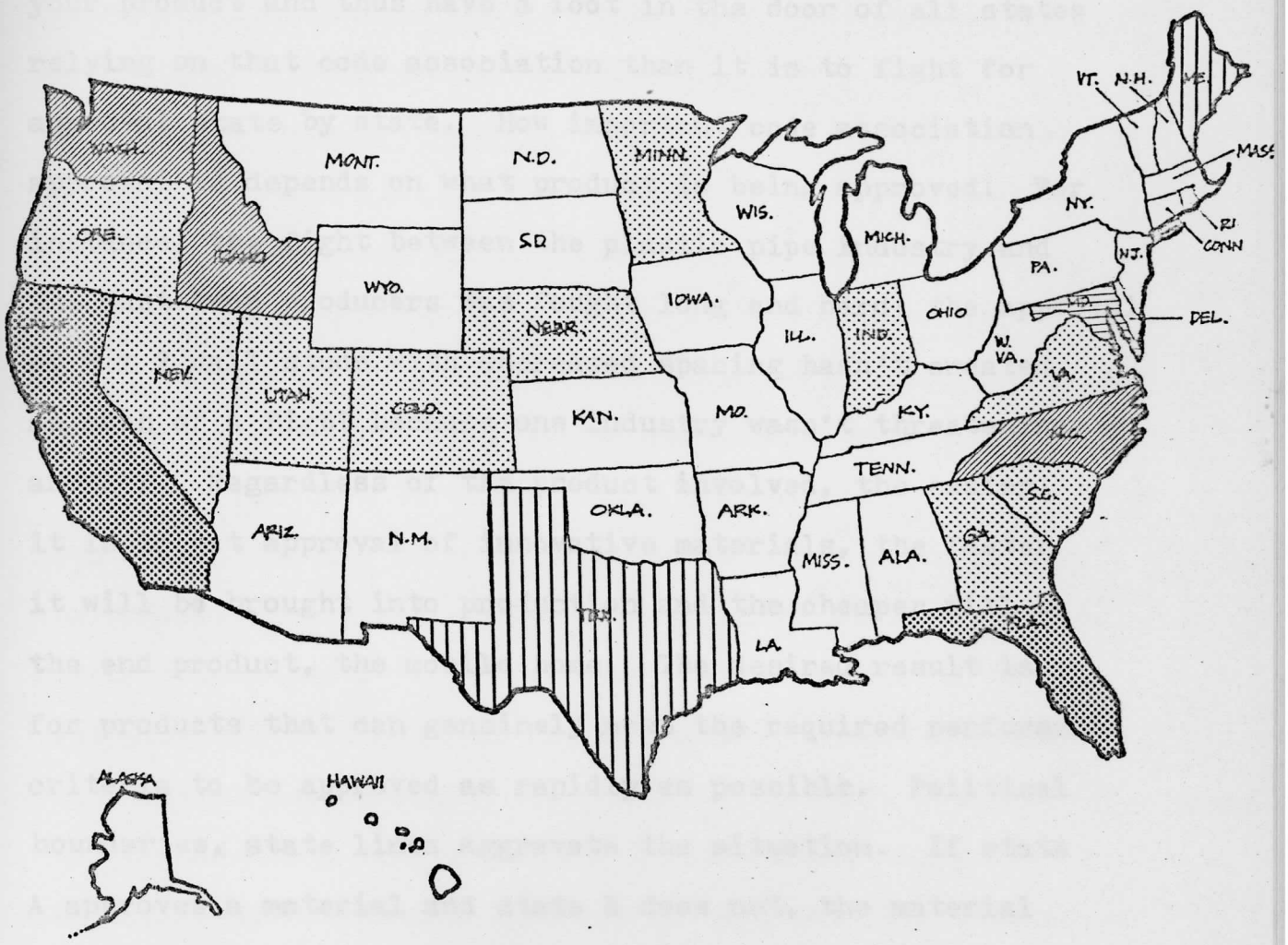


FIGURE 10

MATERIALS AND COMPONENT SYSTEMS APPROVALS

Approves materials listed by national code associations but does not approve materials itself.

Approves materials listed by national code associations and does independent approval.

Approves materials listed by national code associations but reserves the right to modify those listings.

Has not accepted national listings.

Approves materials listed in national code associations if they meet state standards.

Not surveyed or no viable approval program.

your product and thus have a foot in the door of all states relying on that code association than it is to fight for approval state by state. How important code association approval is depends on what product is being approved. For instance, the fight between the plastic pipe industry and the cast iron producers was fought long and hard; the approval of 2 x 2 wall studs with decreased spacing hasn't created as much of a fight because one industry wasn't threatening another. Regardless of the product involved, the easier it is to get approval of innovative materials, the faster it will be brought into production and the cheaper will be the end product, the mobile home. The desired result is for products that can genuinely meet the required performance criteria to be approved as rapidly as possible. Political boundaries, state lines aggravate the situation. If state A approves a material and state B does not, the material producer is directly limited and the mobile home producer must make a decision whether or not to produce two versions of his product or to use the more expensive product for both.

A potential for alleviating this situation would be to provide for inter-code association approval of materials and state recognition of the impotance of uniformity of acceptance of code associations' recommendations. A large step in this direction has been taken by the agreement of BOCA, ICBO, and SBCC to have a uniform approval system for

new materials, but the states' home rule tendency remains as the major hurdle not yet overcome.

Out-of-State Inspections. Most states find it necessary to have, or would like to have, an out-of-state inspection system to insure that mobile homes brought into the state have sufficient quality to pass the state's inspection criteria. Of 18 states having operational mobile home programs surveyed by CES, all but three provide for such out-of-state inspections.

The inspection is usually paid for directly by the manufacturer in the form of fees and per diem expenses for the inspectors. A few states do not charge the manufacturer higher out-of-state fees, choosing instead to spread the cost over all in-state and out-of-state manufacturers through their normal fee schedule.

Out-of-state fees typically include a per hour or per diem rate to pay the inspector's wage, and all expenses that the inspector incurs, including those for food, lodging, and travel. If the inspection program includes frequent visits, this expense can add up quickly. This may cause the manufacturer to raise prices inorder to maintain his profit level, and will eventually cause him to compete less effectively against in-state manufacturers. It may also keep manufacturers from ever entering the market.

It is interesting to note that of the three states not having an out-of-state inspection program, one has a virtually

unfunded system while the other two use third party inspection and rely on reciprocity agreements to insure quality. One of these latter states is Indiana, a major producer and user of mobile homes.

The situation in Indiana points to several potentials for improving the existing systems. First, a strong program of reciprocity agreements between states would eliminate the need for sending inspectors out of state; if the producing state can assure the receiving state of the quality of the product, there is nothing to be gained by having the mobile home reinspected. A second potential (with more sweeping ramifications) is also apparent. Indiana manufacturers are allowed to choose between state and third party inspection, and many are choosing the third party system as a means of unifying the inspections system throughout their plants in various states. If a system of recognized third party inspection agencies were approved by all states, a single inspector could certify the units produced in one state for all other states having the same standards. This would have the effect of an automatic, informal reciprocity agreement among all states using the same code; and since most states use ANSI A119.1, it would provide virtual national uniformity. The cost savings from either system could be passed on to the consumer, making mobile homes less expensive and possibly widening the market.

Identification of State Approved Units. Finished mobile homes on dealers' lots usually bear labels, indicating that the units have been built in compliance with the states' construction codes. These labels may be issued by the state, by a third party inspection agency, or by a manufacturers group such as MHMA or TCA. Some units may bear labels of all three types.[40]

A few states require no labelling. The absence of any clear indication of code compliance on units in such states may adversely affect consumer confidence and attitudes, but reputable manufacturers, by building to A119.1 standards, obtain MHMA or TCA approval and labelling and thus minimize this problem.

The most unfortunate effect of the system of labelling, as seen from a nationwide perspective, is its contribution to regulatory inconsistency in general. It is simply another example of the unnecessary confusion of requirements which adds to the cost of manufacturing, distrubuting, and code enforcement. Multi-plant regional or national manufacturers especially would benefit from standardized requirements.

Increasing state acceptance of third party inspection is an encouraging trend in this area. UL, for example, is inspecting in 200 plants in about half the states, and UL methods and labels are increasingly being recognized as sufficient evidence of state code compliance.

[40] Mobile-Modular Housing Dealer Magazine, July 20, 1973, p. 88-93.

TECHNICAL CONTENT OF MOBILE HOME CODE ANSI A119.1

Development of ANSI A119.1

During the early years of the development of the mobile home industry, mobile homes were commonly treated as personal property rather than as real estate. As a result, manufacturers were not generally required to conform to conventional building code standards. Manufacturers were able to use materials and construction methods which substantially reduced production costs and thus enhanced the market for mobile homes as a form of low cost housing. At the same time, however, some mobile home manufacturers were marketing poor quality, and in some cases even dangerous products. This condition, plus the ever increasing size of the mobile home industry, contributed to the development of a kind of legal vacuum in the field of public safety regulations for mobile homes.

Recognizing this vacuum, and recognizing that state and local governments had already begun to legislate local construction standards to fill it, seeing the likelihood of more such legislation, MHMA undertook the task of developing and promoting standards of its own. The objective of this effort was to avoid industry subjugation to the kind of complex and sometimes contradictory standards which face

the on-site residential building industry nationally. MHMA members were aware that if they were forced to comply with the provisions of a similar maze of local codes, they would practically have to custom-build units for each code jurisdiction and would thus lose much of the price advantage they held in the market.

In the 1950's the MHMA approached the American Standards Association (ASA) to seek their cooperation in developing a mobile home code geared to the special conditions of mobile home production. A set of standards was developed cooperatively by MHMA representatives and code writing experts from impartial, nationally known safety groups. The National Fire Protection Association (NFPA), which had been directly involved in the drafting of that first code and whose fire safety standards had been drawn upon extensively, contributed substantially to later revised versions. In 1963, ASA approved and published "American Standard A-119.1-1963 for Installation in Mobile Homes of Electrical, Heating and Plumbing Systems". In 1967, the MHMA adopted "Minimum Body and Frame Design and Construction Standards". The United States of America Standards Institute (USASI) incorporated these standards in the 1969 edition of A119.1. Throughout this time NFPA and other organizations took an active role in revising the code.

Currently, the American National Standards Institute

regularly publishes revised editions of the code after submitting proposed amendments to its members for approval. Revisions are researched and drafted by a task force of experts in each area of regulation, under NFPA coordination.

The code regulation is now being significantly reduced by state action and by MHMA activities. States that have legislated mobile home construction requirements have most frequently adopted A119.1 as a whole or have used A119.1 as a model upon which to base their codes. In states with no state-enforced mobile home construction codes, MHMA and Trailer Coach Association (TCA) are policing their members, requiring compliance with A119.1 as a condition of continued membership. It is estimated that currently more than 75% of the mobile homes built in the United States are certified as complying with the standards of some version of A119.1.

Is the Mobile Home Code Adequate?

The problem of determining the adequacy of the mobile home code is associated with the problem of determining the adequacy of all codes. Essentially, there is no objective means of developing building standards - it is largely a matter of judgement. Many of the requirements are based on

experience rather than scientific facts.[41] This is reflected by the existence of no universally recognized national building code for conventional construction.

As previously discussed, the situation is different for mobile homes. ANSI is the only mobile home code in general use throughout the nation. Nevertheless, however advantageous this national code has been to the industry, it has been criticized as being sub-standard. This judgement, perhaps justified, has focused largely on: poor resistance to overturning from high winds; a higher frequency of mobile home fires that are often more fatal than fires in conventional homes; cheaper construction and the image of poor construction; and identification with transients. Despite these criticisms, the mobile home now accounts for 20 - 25% of the new housing in the United States each year.

Fire Safety Requirements. Fire safety in mobile homes has been an area of increasing concern to most communities with mobile home parks. Statistics show that this concern has not been unwarranted. However, compliance with A119.1 has apparantly improved the situation. In Oregon, in 1970 (the first year that ANSI standards were applied) there was less of a chance of fire developing in a mobile home than a conventional home. However, in the same state the chance of death occurring from fire in a mobile home was 3.3 times greater than in a conventional

home. Average insurance payments for fire loss in 1971 were three times greater for mobile homes than for conventional homes.[41]

Several reasons for this are cited. First, the long, narrow shape and amount of combustible material in mobile homes contribute to a "tunnel" effect which helps spread fire. Secondly, the thin paneling installed in mobile homes is highly flammable. Also, the small ventilation area of the mobile home allows smoke to rapidly fill living areas making escape more difficult. It is also reported that exterior doors with metal frames tend to warp when there is a fire, making exterior doors inoperable. Finally, windows are said to be too small or too high to be used for emergency exits.[42]

The widespread adoption of mobile home codes by states is relatively recent. To a certain extent this prevents the analysis of meaningful statistics on those new mobile homes that are built in conformance with A119.1. However, the comparison of the mobile home code with a conventional code (New York State Building Construction Code applicable to One- and Two-Family Dwellings) may help to determine the degree to which mobile home requirements are satisfactory or unsatisfactory.

[41] Macfall and Quinton, Mobile Homes and Low Income Rural Families. (Washington, D.C.: Government Printing Office, February 20, 1973), p. 31.

[42] Ibid., p. 32.

Presumably the major cause for the extreme flammability of mobile homes is the paneling and plank-board ceilings that are typically installed. Table 5 compares the flame spread requirements for A119.1, the New York State Mobile Home Code, and the New York State conventional code. A119.1

TABLE 5

MAXIMUM SURFACE FLAME SPREAD REQUIREMENTS

ANSI A119.1[1] (1972)	New York State[2] Mobile Home	New York State[3] 1 and 2 family
200	75	200

[1] Applies to the interior finish of habitable rooms and hallways, excluding molding, doors, trim, cabinets and splash panels.

[2] Applies to the interior surface of walls and ceilings, interior trim and decorative materials ... excluding paint, wallpaper and materials less than 1/64 inch thick.

[3] Applies to interior wall and ceiling finish materials in any location other than an enclosed exit.

compares favorably with the conventional code requirements, while the requirements of the NYS Mobile Home Code appear significantly more restrictive.

A further criticism of the ANSI mobile home code concerns the inadequacy of windows and doors as emergency exits. There is no standard in any of the codes that specifies requirements for door frames. Table 6 compares requirements for openings for emergency use of the three

TABLE 6

REQUIREMENTS FOR OPENINGS FOR EMERGENCY USE IN SLEEPING AREAS

	ANSI A119.1 (1972)	N.Y. State Moble Home	N.Y. State 1 & 2 Family
Min. least dimension	22"	22"	18"
Min. area	5 SF	5 SF	4 SF
Max. height from floor to bottom of opening	4'-0"	4'-0"	3'-6" except 4'-6" when req'd in basement

codes. The minimum least dimension as well as the minimum area requirement for the mobile home code allow for larger openings. The maximum height from the floor to the bottom of the opening for mobile homes is 6 inches higher than the maximum allowable under the N.Y.S. 1 and 2 family code, although the conventional code is less restrictive in basement areas.

The conclusion is that ANSI A119.1 is usually consistent with the minimum standards specified by the N.Y.S. conventional code and, in some instances, more restrictive. This suggests that statistics pointing to the poor fire safety performance of mobile homes may be influenced by the pre-ANSI A119.1 (e.g. poorer quality) mobile homes that are still in use.

Resistance to Overturning and High Winds. Mobile homes are also criticized for their apparent vulnerability to

high winds. There are two major considerations involved with the analysis of this problem: 1. The resistance to horizontal wind of the mobile home unitsitself and 2. The adequacy of anchorage requirements to prevent overturning of the mobile home.

Mobile home horizontal wind load requirements have been judged insufficient to meet the required wind loads. for both hurricane areas (120 MPH) and standard wind (75 MPH). A formula from the American Institute of Civil Engineers (AICE) states that, in order to resist 75 MPH winds, the load requirement should be 16.9 psf. The mobile home horizontal wind load requirements for standard wind zones is 15 psf. Similarly, the AICE formula shows that, for hurricane zones, the 25 psf requirement can only resist winds of 93 MPH.[43]

Since there are similar requirements referred to in the NYS conventional code, a comparison may be drawn with the mobile home standards. (see Table 7) Insofar as all

TABLE 7

WIND LOADS FOR WALLS IN LBS PER SF

ANSI A119.1 (1972)	N.Y. State Mobile Home	N.Y. State 1 & 2 Family
15	15	15

of New York State is in a standard wind zone, no comparison

[43] Macfall and Quinton, Mobile Homes, p. 30.

may be made concerning hurricane zones. However, as can be seen in Table 7, all three codes have precisely the same horizontal wind load requirements. Apparently the formula used in determining the requirements for the N.Y.S. codes is different than the AICE formula. Which formula is "correct" is, again, a matter of judgement.

Anchorage requirements are unique to mobile homes and thus cannot be compared with conventional codes. However, NFPA 501A Standard for Mobile Home Parks, section 4, specifies load requirements for anchors, placement of anchors and durability requirements of anchors. Without adequate data on the performance of units adhering to these standards it is difficult to determine their sufficiency. Whether or not these standards are even enforced depends entirely on local authorities. The N.Y.S. Division of Housing does not enforce standards at the local level.

Poor Construction Quality. The question of quality of mobile home construction is difficult to convincingly resolve. The advantage of the mobile home has been its ability to use inexpensive methods of construction. There have always been a few manufacturers who have chosen not to build in compliance with A119.1. Thus, the action by numerous legislatures to regulate the construction of mobile homes has had a positive effect on the upgrading of the mobile home. The result generally has been a better

engineered product including:[44]

a. A better engineered chassis - cambered, stronger and lighter.

b. Use of 2x6 floor joists rather than 2x4's.

c. Use of metal gusset plates or tie plates for joint reinforcements to allow better load distribution between the floor - wall and roof - wall connections.

d. Use of diagonal steel straps to prevent racking while the unit is being transported.

e. Better sidewall studding - changes from 2x2's to 2x3's to 2x4's.

f. Stronger, more efficient rafters.

A comparison of design live loads for the three codes also reinforces the supposition that A119.1 has improved. All of the codes in Table 8 show that the uniform live load imposed on floors and roofs are equal.

TABLE 8

MINIMUM UNIFORM LIVE LOAD REQUIREMENTS

	ANSI A119.1 (1972)	N.Y. State Mobile Home	N.Y. State 1 & 2 Family
Floor	40 lb/sf	40 lb/sf	40 lb/sf
Roof	30 lb/sf	30 lb/sf	30 lb/sf

[44] Arthur D. Bernhardt, Program in the Industrialization of the Housing Sector, M.I.T.

In general, the construction standards of ANSI A119.1 have increased the quality of mobile homes, at least in several critical areas, to a comparable level with conventional construction. This is not to say that mobile homes are built to the same specifications as conventional homes. But the development of the mobile home code has induced a general trend towards increased quality which is apparently continuing. For example, one mobile home plant in New York not only uses the conventional 2x4's at 16" intervals, but has also recently begun to install conventional gypsum board beneath the traditional paneling.

Insulation and Heat Loss Requirements. The N.Y. State conventional code contains no insulation requirements, so comparison with A119.1 is impossible. Even the N.Y. State Mobile Home code specifies only that "insulation provided to reduce the rate of heat flow through the mobile home construction shall conform to the requirements of generally accepted standards".[45] On the other hand, the ANSI A119.1 has been sensitive to heat loss requirements and, beginning in 1969, included these requirements in the code. As can be seen in Table 9, ANSI A119.1 requirements for heat loss and minimum R values using gas/oil or electricity

[45] Division of Housing and Community Renewal, Housing and Building Codes Bureau, State Code for Construction and Installation of Mobile Homes, New York, p. 23.

TABLE 9

SUMMARY OF MOBILE HOME CODE IMPROVEMENTS IN HEAT LOSS AND MINIMUM R VALUES

	ANSI A119.1, 1972		USASI A119.1, 1969	
Heat Loss:				
Gas & Oil	50 BTU/hr/ft^2 or 333 BTU/hr/lin. ft.		50 BTU/hr/ft^2 or 375 BTU/hr/lin. ft.	
Electricity	40 BTU/hr/ft^2 or 267 BTU/hr/lin. ft.		0.184 watts/hr/ft^2 or 40 BTU/hr/ft^2	
Minimum R Value:	Gas/Oil	Elect.	Gas/Oil	Elect.
Wall	5.5	9.0	5.5	6.5
Ceiling	8.2	12.5	8.2	13.0
Floor	5.5	12.3	5.5	12.0

as the primary fuel have tended to increase since their adoption in 1969. This, of course, does not mean that they have reached the point where they might be deemed "adequate". Table 10 compares R values for mobile homes, conventionally constructed homes and the recently released Federal guidelines. (Design and Evaluation Criteria for Energy Conservation in New Buildings, February 27, 1974). For mobile homes

TABLE 10

COMPARISON OF R VALUES

	ANSI A119.1		CONVENTIONAL[1]		FEDERAL GUIDELINES (min and max for N.Y.S.)
			Thermal performance reference values		
	Gas/Oil	Elect.	"good"	"moderate"	
Wall	5.5	9.0	11	8	15.12-11.08
Ceiling	8.2	12.5	19	13	19.92-14.00
Floor	5.5	12.3	13	9	not avail.

[1] Joseph N. Boaz, Architectural Graphic Standards, (New York: John Wiley & Sons, Inc., 1970), p. 319.

using gas/oil heat, the minimum R values are lower than those recommended for conventional construction and much lower than the new Federal guidelines. On the other hand, mobile home requirements using electric heat are reasonably consistent with conventional construction recommendations, while still falling below the new Federal guidelines.

In summary, there appears little doubt that heat loss requirements for mobile homes using gas/oil fuel are below those of conventional construction and might be termed inadequate. For mobile homes heated by electricity, the heat loss requirements are more consistent with generally recommended conventional construction practices.

Eventually, decreased availability of energy supplies will require that past practices take into account life cycle costs of building construction. Interim energy standards for both conventional construction and mobile homes are presently being developed, with the ultimate goal of establishing model energy conservation codes. It is in the interest of both the states and the housing industry for the states to adopt the model codes so that the energy conservation standards may be applied on a uniform, nation-wide basis.

Livability. This general consideration arises from criticism that mobile homes do not provide an adequate living environment for occupants of mobile homes.

Previous studies[46] indicate that there are two major user groups utilizing mobile homes: 1. young households with one or two children, usually preschool and 2. Older, two-person households, usually retired. The mobile home is least adequate for the second user group - elderly persons.

More data on the response of this population to the existing mobile home environment should be collected in order to provide guidelines for improvements; however, several areas could be immediately revised. All mobile homes for use by older persons should be easily accessible to those confined in wheelchairs. This requirement may necessitate the addition of ramps with hand rails at entrances, and widening of halls. Additionally, bathrooms and kitchens should be provided (as an option) to respond to the specific needs of the older person in these rooms.

[46] Drury, Margaret J., Mobile Homes, The Unrecognized Revolution in American Housing (New York: Praeger, 1972) and Morris, Earl W. and Woods, Margaret E., eds., Housing Crisis and Response: The Place of Mobile Homes in American Life (Ithace, N.Y.: New York State College of Human Ecology at Cornell, 1971)

CONCLUSION

CONCLUSIONS AND RECOMMENDATIONS

This study has attempted to estimate both the positive and negative impacts of the recent N.Y. State regulation of the mobile home and factory manufactured housing industries on the industry and the community. Analysis of these regulations on the national level, as well as the level of New York State, has generated the following findings:

1. The state adoption of preemptive mobile home and factory-built housing codes has had a positive effect on the industry by unifying the intrastate system of building code regulation. Increased interstate code uniformity could also induce a better performance of these industries.

2. The lack of uniformity of inspection (including in-state, out-of-state and on-site inspections) adversely affects uniformity. Differences in interpretation of codes and variations between inspections are probably more significant than variations in the content of the codes themselves.

3. Most states, including New York, have been unable to establish viable mutual recognition programs with other states. This has generally had a negative impact on both the mobile home and manufactured housing industries.

4. Inspector training and inspector certification have the potential of increasing uniformity of interpretation and inspection. The general lack of established, formal training programs, nationally as well as within the State of New York, has made the quality of manufactured housing less predictable and has resulted in a higher total cost to the buyer.

5. The present system of initial evaluation and certification of manufacturers' plans in New York State has a negative influence on particularly the factory-built housing industry. State evaluation agencies cause the multiple submission of plans from manufacturers that market their homes interstate. Some N.Y. State factory manufactured housing producers indicate that approvals take too long and are too costly.

6. Some states, including New York State, provide no automatic procedure for amending state codes. Where the mobile home code is concerned, this means that different requirements will tend to exist in neighboring states. In both the mobile home codes and the factory manufactured housing codes this deficiency affects the degree to which regulations are technologically current.

7. The mobile home code and the factory manufactured housing code in N.Y. State have no energy conservation standards. ANSI A119.1 does have heat loss requirements and R value requirements, but these are generally inadequate to meet today's energy shortage.

8. The requirements of ANSI A119.1, Standard for Mobile Homes, upon which the N.Y. State rules and regulations are based, are generally comparable to the requirements of the New York State building construction code. The New York State Mobile Home Code is, in some instances, more restrictive than both the ANSI A119.1 and the N.Y. State conventional construction building codes.

Recommendations

On the basis of the above findings the following recommendations are made:

1. The State of New York should adopt one of the three national model codes (e.g. Uniform Code, Basic Code, or Southern Code) as the technical basis for its factory manufactured housing rules and regulations.

   The New York State regulations for factory manufactured homes are presently based on the New York State Building Construction Code. These regulations are unique to the State and therefore restrict the implementation of reciprocity with other states. Adoption of one of the model codes in New York State would increase the interstate uniformity of regulation; increase the possibility of establishing reciprocity programs, and therefore increase the market for the manufactured housing firm. A larger market leads to economies of scale and, eventually, to a lower cost for the consumer.

2. New York State should enact legislation that would authorize the Building Codes Council of the New York

State Division of Housing and Community Renewal to promulgate a building code governing the manufacture of all building types and components, not just housing.

In the states surveyed by the CES study, nine already regulated all form of construction and building types. This type of code is important since major companies are already taking leading positions in the manufacture of building components and subsystems. These corporations include: Alcoa, Westinghouse Electric, Armstrong Cork and Keene; others are expected to follow. New York State should establish a manufactured building regulation for all building types to encourage the growth of this industry and help restrain the accelerating costs of construction.

3. The New York State Housing and Building Code Bureau should have statutory responsibility to adopt the most modern technology available for its mobile home and factory manufactured housing codes.

The New York State Building Construction Code, on which the factory manufactured housing regulations are based, has been amended only once (January 1, 1973) since December 1, 1964. This means that N.Y. State home buyers may be prevented from benefiting from cost-saving changes in technology - sometimes for many years. In contrast, the model code agencies (BOCA, ICBO and SBCC) annually review their codes and changes are made by a vote of the membership. Administrators of the N.Y. State codes should be required to similarly maintain technologically current standards. This would most easily be achieved by annually adopting appropriate sections of the ANSI A119.1 model mobile home code and sections from one of the model conventional codes.

4. <u>New York State should utilize the State's community college system to establish formal training programs leading to eventual certification for building officials and inspectors.</u>

Improved inspector qualifications are imperative if New York State is to take advantage of the increased performance orientation of building codes.

There is a community college in every county of the State. This advantageous situation could be the means through which state inspectors and local building officials are trained on a more uniform basis, eventually increasing the consistency and quality of building code interpretation throughout the state.

5. <u>The State of New York should adopt model codes dealing with energy conservation in mobile and factory produced housing as soon as these codes are available</u>.

State by state legislation and promulgation of energy conservation standards, while perhaps solving the energy problem, could be unnecessarily harmful to the manufacture of mobile and factory produced homes. Uniformity of building requirements between states, a goal of NCSBCS and the model code agencies, would be diminished. The adoption of uniform model energy conservation codes, now being developed, would prevent this from occurring.

6. <u>New York State should require that a consumer information manual be distributed by the manufacturer to</u>

all purchasers of mobile homes or manufactured housing.

The present inspection system of mobile homes and manufactured housing is not infallible. A true measure of itszperformance can only be measured if the number of deficient units missed by the inspector is known. However, most home purchasers do not have the training or expertise to identify any but the most glaring deficiencies. This has caused a number of home buyers to turn to private home inspection agencies. The president of one of these companies estimates that 10% of new homes have "major defects".[46]

Rising consumer awareness in the area of home building requires that the state take measures to guard against defective construction. Feedback from the user is necessary to evaluate the reliability of existing inspection systems. A consumer information manual would give the purchaser a guide to judge, for himself, the construction of a new mobile or factory produced home. A system in New York already exists for directing consumer complaints to the consumer protection agency of the State's Attorney General.

7. <u>The evaluation of plans and specifications submitted by manufacturers of both mobile homes and factory-built homes should be accomplished by third party agencies (e.g. Underwriters Laboratory or Pittsburgh Testing).</u>

Initial evaluation and certification of plans in New York State is presently carried out by the New York State Housing and Building Codes Bureau - a state agency. The use of a state agency tends to limit the ability to establish reciprocity programs with other states. This, in turn, increases the cost to the manufacturer (and eventually the the consumer) of marketing in other states.

New York State manufacturers of housing and and mobile homes surveyed by this study unanimously preferred evaluation by third parties. This is consistent with the national findings. A third party evaluation system will help create uniformity, increasing the potential for the manufacturer of low cost housing.

8. <u>New York State Housing and Building Code Council should actively seek to establish reciprocity programs with neighboring states for both mobile</u>

homes and manufactured housing programs.

The lack of active reciprocity programs among states has a major cost impact on the manufacturer of mobile and factory-built homes. Many units have to be inspected by several sets of state inspectors while only one inspection is really necessary to insure the quality of the unit. The effect of multiple inspections is increased costs to the buyer and higher governmental costs which have to be borne by the public as a whole.

APPENDIX

Syracuse University

School of Architecture
417 Slocum Hall
Syracuse New York 13210
tel (315) 476-5541 ext 2256

April 18, 1974

Dear Sir:

I am working with the New York State Assembly Scientific Staff and the New York State Building Code Bureau to evaluate the effectiveness of current New York State laws and regulations pertaining to industrialized housing.

The objective of this study is to determine the impact (both positive and negative) of current regulations on both the mobile home and factory manufactured home industries. I will be recommending changes that will improve the system for you and other home manufacturers.

To achieve these goals I shall be conducting telephone interviews with manufacturers throughout the State during the week of April 22 - April 26. All material collected will be kept strictly confidential and will be abstracted in the final results.

I am looking forward to talking with you.

Sincerely,

Robert E. Johnson

TELEPHONE SURVEY RESULTS
N.Y.S. MOBILE HOME MANUFACTURERS

I was able to speak to all of the four mobile home manufacturers that are located in New York State. The answers to the survey questions were as follows:

1. HOW LONG HAS YOUR COMPANY/PLANT BEEN IN BUSINESS?

   2 years
   2½ years
   19 years
   2 years

2. WHAT TYPE OF UNITS ARE PRODUCED BY YOUR COMPANY?

   Double-wide and Single-wide (14')
   Single-wide
   Single-wide
   Single-wide (12' and 14')

3. WHICH STATES HAS YOUR COMPANY SHIPPED INTO?

   Canada, New England, Penn., N.J.
   New England
   Penn., Vermont, Maine, Mass, R.I., Conn.

4. GENERALLY SPEAKING, HAVE YOU FOUND THAT STATE LAWS AND REGULATIONS RELATING TO MOBILE HOMES HAVE BEEN BENEFICIAL TO YOUR BUSINESS INTEREST? PLEASE GIVE REASONS FOR YOUR ANSWER.

   Yes, but better enforcement is necessary.
   Yes, but should be enforced.
   Yes, forces manufacturer to comply with regulations.
   Yes.

5. IN YOUR OPINION, SHOULD THE INITIAL TECHNICAL EVALUATION AND CERTIFICATION OF YOUR MOBILE HOMES BE MADE AT THE STATE LEVEL? OR BY QUALIFIED THIRD PARTIES? PLEASE GIVE REASONS FOR YOUR ANSWER.

   Third Party, State personnel less qualified.
   Third Party.
   Third Party.
   Third Party.

6. AFTER THE EVALUATION IS COMPLETE, DO YOU FEEL THAT IN PLANT COMPLIANCE INSPECTIONS SHOULD BE MADE BY THE STATE, OR BY QUALIFIED THIRD PARTIES? PLEASE GIVE REASONS FOR YOUR ANSWER.

Doesn't matter.
Third Party.
Up to state to choose.
Third party.

7. HOW FREQUENTLY DO YOU FEEL IT NECESSARY FOR IN PLANT INSPECTORS TO CHECK A MANUFACTURER'S PRODUCT?

Once per week. Depends on volume.
Once per month, then maybe taper off.
Once every 2 -3 weeks.
Once every 2 - 3 days.

8. HAVE YOU FOUND THAT INSPECTORS DISRUPT YOUR PRODUCTION LINE?

No.
No.
No.
No answer.

9. PLEASE LIST THE QUALIFICATIONS AND BACKGROUND THAT YOU FEEL SUCH PRODUCTION LINE INSPECTORS SHOULD POSSESS.

Product knowledge, codes knowledge, knowledge of good public relations.
Know production line, know code, graduate engineer.
Familiarity with construction techniques.
Knowledge of construction industry, familiar with codes.

10. DO YOU PROVIDE A SO-CALLED "OWNERS MANUAL OR INFORMATION PACKAGE TO THE PURCHASERS?

Yes.
Yes.
Yes.
No answer.

11. COULD YOU, IN GENERAL, SUGGEST OTHER METHODS OR IMPROVEMENTS WHICH COULD BE MADE IN THE MOBILE HOME CODE?

State officials should consult more with manufacturers prior to establishing code.
None.
No.
No.

TELEPHONE SURVEY RESULTS
N.Y.S. MANUFACTURERS OF FACTORY BUILT HOMES

In selecting potential respondents to this survey it was desirable to choose those manufacturers that had been in business for at least two years and therefore had experience in the State both before and after the effective date (Jan. 1, 1973) of the Factory Manufactured Housing Code. Since several manufacturers had gone out of business, the number of companies to be surveyed was reduced to four. This number was substantiated by one respondent who believed that his company had only one or two competitors in the State. The actual number of companies surveyed was reduced to three - despite repeated call-backs, it proved impossible to survey the fourth company. The answers to the survey questions were as follows:

1. WHAT IS THE TYPE OF UNIT PRODUCED BY YOUR COMPANY?

   Single Family
   Single Family
   Motel-Hotel

2. HOW LONG HAS YOUR COMPANY BEEN IN BUSINESS?

   4 years.
   2½ years.
   3½ years.

3. WHAT TYPE OF PRIMARY STRUCTURAL SYSTEM DO YOU USE?

   Wood frame.
   Wood.
   Concrete.

4. WHICH STATES HAS YOUR COMPANY SHIPPED INTO?

   N.Y., Mass.
   Penn., N.J., Maine, Vermont, Mass.
   Minnesota.

5. GENERALLY SPEAKING, HAVE YOU FOUND THAT STATE LAWS AND REGULATIONS RELATING TO INDUSTRIALIZED BUILDING HAVE BEEN BENEFICIAL TO YOUR BUSINESS INTEREST? WHY?

   No. Costs too much, takes too long for approvals
   No.
   No answer.

6. IN YOUR OPINION, SHOULD THE INITIAL TECHNICAL EVALUATION AND CERTIFICATION OF YOUR FACTORY PRODUCED UNITS BE MADE AT THE STATE LEVEL? OR BY QUALIFIED THIRD PARTIES? WHY?

Third parties. State bureaucracy is too big.
Third parties. Unbiased, familiar with industry.
Third parties. Close enough to industry, professional expertise.

7. AFTER THE EVALUATION AND CERTIFICATION IS COMPLETE, DO YOU FEEL THAT IN PLANT COMPLIANCE INSPECTIONS SHOULD BE MADE BY THE STATE? OR BY QUALIFIED THIRD PARTIES? WHY?

Third party
Third parties.
Third parties.

8. HOW FREQUENTLY DO YOU FEEL IT NECESSARY FOR IN-PLANT INSPECTORS TO CHECK A MANUFACTURER'S PRODUCT?

Once a week.
Depends on volume.
Bi-weekly. Tasks highly repetitive.

9. HAVE YOU FOUND THAT INSPECTORS DISRUPT YOUR PRODUCTION LINE FLOW?

No.
No answer.
No.

10. PLEASE LIST THE QUALIFICATIONS AND BACKGROUND THAT YOU FEEL SUCH PRODUCTION LINE INSPECTORS SHOULD POSSESS.

Enough background.
6 months - 1 year in the modular field.
Knowledge of codes, qualified engineer.

11. WHAT STEPS OR PROCEDURES COULD THE STATES TAKE TO REDUCE THE COSTS OF APPROVAL AND INSPECTION?

Approve a system rather than a model.
No answer.
No answer.

12. IN GENERAL, COULD YOU SUGGEST OTHER METHODS OR IMPROVEMENTS WHICH COULD BE MADE TO THE STATE FACTORY MANUFACTURED HOUSING CODE?

Already given.
No answer.
Decrease approval time, increase interstate reciprocity.

BIBLIOGRAPHY

"An Analysis of the Probable Impact of the California Factory Built Housing Law," Stanford Law Review, XXIII (May, 1971), 978-94.

ANSI A119.1 Standard for Mobile Homes (New York: American National Standards Institute, 1972).

Bair, Frederick H., Regulation of Modular Housing, with Special Emphasis on Mobile Homes (Chicago: American Society of Planning Officials, 1971).

Bender, Richard, A Crack in the Rear View Mirror (New York: Van Nostrand Reinhold, 1973).

The Buffalo Organization for Social and Technological Innovation, A Model for an Industrialized Housing Industry in the United States (Buffalo, N.Y.: BOSTI, Inc., n.d.).

Cassimatis, Peter J., Economics of the Construction Industry (n.p.: The Conference Board, n.d.).

Committee on Industrialized Housing of the National Academy of Engineering, Industrialized Housing (Washington, D.C.: National Academy of Engineering, 1972).

Cox, Reavis and Goodman, Charles S., "Marketing of House-building Materials," Social Issues in Marketing, Edited by Lee E. Preston. (Glenview Ill: Scott, Foresman & Co., 1968).

Dietz, Albert G.H. and Cutler, Laurence, eds. Industrialized Building Systems for Housing (Cambridge, Mass: MIT Press, 1971).

Dinezio, Charles J. and Stanton, P.E., eds. Reports Relative to the Development, Administration, and Enforcement of Building and Housing Codes. (Boston: The Commonwealth of Mass., Department of Community Affairs, April, 1971).

Drury, Margaret J., Mobile Homes: The Unrecognized Revolution in American Housing.(New York: Praeger, 1972).

Eaves, Elsie. How the Many Costs of Housing Fit Together. (Washington, D.C.: Government Printing Office, 1969).

"Factory-built Housing: Statutory Solutions," The University of Chicago Law Review (Summer, 1971) 788-806.

Finger, Harold B. "Operation Breakthrough's Approach to Building Codes, Zoning and Site Design." The George Washington Law Review, Vol 39 No 4 (May, 1971).

Gibson, Constance B., Policy Alternatives for Mobile Homes (Brunswick, N.J.: Center for Urban Policy Research, Rutgers University, 1972).

Grasso, J., "Will State Factory Housing Laws be a Help or Just Another Hinderance?" House and Home Vol 40 (September, 1971); 56.

"Group Approves Model Legislation," Automation in Housing Vol 10 No 8 (October, 1973) 10.

"Hearth-aches: Homeowners Outraged by New House Defects and Delays on Repairs." The Wall Street Journal April 3, 1973, p. 1.

Hudson, James W, "Beating Codes and Costs." Systems Building News (January, 1974) 29-38.

Koch, Carl and Lewis, Roger K., Roadblocks to Innovation in the Housing Industry (Washington, D.C.: Government Printing Office, 1968).

Levy, Ronald and Wilbur, D. Elliot Jr., Opportunities in Building Components and Subsystems.(Cambridge, Mass: Arthur D. Little, Inc., 1972).

Macfall, Emily A. and Gordon, E. Quinton, Mobile Homes and Low-income Rural Families (Washington, D.C.: Government Printing Office, 1973).

"Model Code Approved for Factory Housing," Engineering News Record Vol 188 (April 27, 1972) 16.

Morris, Earl W. and Woods, Margaret E., eds., Housing Crisis and Response: The Place of Mobile Homes in American Life, (Ithaca, N.Y.: New York State College of Human Ecology at Cornell, 1971).

New York State Division of Housing and Community Renewal, Housing and Building Codes Bureau, State Building Construction Code Applicable to One- and Two-Family Dwellings (Including Factory Manufactured Homes), New York, January 1, 1973.

New York State Division of Housing and Community Renewal, Housing and Building Codes Bureau, State Code for Construction and Installation of Mobile Homes, New York, January 15, 1974.

New York State Division of Housing and Community Renewal, Housing and Building Codes Bureau, Standards, Rules and Regulations for Factory Manufactured Homes, New York, January, 1, 1973.

Pollock, Richard, "Supply of Residential Construction: A Cross-Section Examination of Recent Housing Market Behavior." Land Economics. Vol XLIX (February, 1973) 57-66.

"Presenting the AIH Editorial Review Board, Codes and Zoning," Automation in Housing Vol 10 No 8 (October, 1973) 29.

Roberts, John, "Home Building USA: A Systems Analysis," Industrialized Forum (April, 1970) 35-40.

Sanderson, Richard L., Codes and Code Administration (Chicago, Ill: Building Officials Conference of America, Inc., 1969).

Schon, Donald, Technology and Change (New York: Delacorte Press, 1967).

Semling, H., "Building Codes Conference Execs Hit Standards Groups for Slowness in Achieving Uniformity." American City, (November, 1973) 83.

Smith, Wallace F., Housing, The Social and Economic Elements, (Berkeley: University of California Press, 1970).

Stigler, George J., The Theory of Price, (New York: The Macmillan Co., 1966).

Testa, Carlo, Industrialization of Building. (Van Nostrand Reinhold, 1973)

Towards Industrialized Building (New York: Elsevier Pub. Co., 1966).

U.S. Advisory Commission on Intergovernmental Relations. Building Codes: A Program for Intergovernmental Reform (Washington, D.C.: Government Printing Office, 1966).

U.S. Congress, Joint Economic Committee, Subcommittee on Urban Affairs, Industrialized Building (Washington, D.C.: Government Printing Office, 1969).

U.S. Department of Commerce, National Bureau of Standards, Design and Evaluation Criteria for Energy Conservation in New Buildings (Washington, D.C.: Government Printing Office, 1974)

U.S. Department of Commerce, National Bureau of Standards, Industrialized Building in the Soviet Union, (Washington, D.C.: Government Printing Office, 1971).

U.S. Department of Commerce, National Bureau of Standards, Technical Options for Energy Conservation in Buildings (Washington, D.C.: Government Printing Office, 1973).

U.S. Department of Housing and Urban Development, Industrialized Building - A Comparative Analysis of European Experience (Washington, D.C.: Government Printing Office, 1968)

U.S. National Commission on Urban Problems, Building the American City (Washington, D.C.: Government Printing Office, 1969)

Ventre, Francis T., Maintaining Technological Currency in the Local Building Code: Patterns of Communication and Influence (Washington, D.C.: International City Management Association, April, 1971).

"Washington - Indiana Reciprocity and Agreements with Out-of- State Jurisdictions." National Conference of States on Building Codes and Standards News Vol 2 No 4 (March, 1974) 1.

"Which Modular Firms are Making It, Which Aren't, How Come." House and Home (October, 1972) 80.